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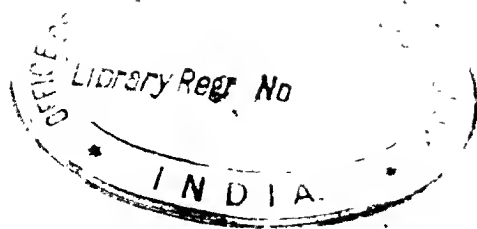
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THE  
JOURNAL  
OF THE  
ROYAL GEOGRAPHICAL SOCIETY.

VOLUME THE THIRTIETH.

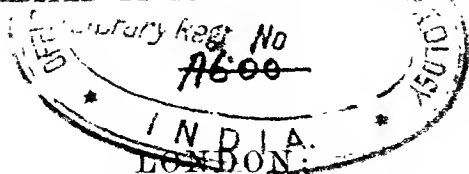
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910.5  
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1860.

EDITED BY DR. NORTON SHAW.



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# CONTENTS OF VOL. XXX.

	PAGE
Council Report, Balance-Sheet for 1859, and Estimate for 1860 ..	v—ix
Library Regulations, List of Council, Officers, and Fellows .. ..	x—l
List of Public Institutions, &c., to which the Publications are presented	li
Individuals to whom the Royal Premium has been awarded .. ..	lii
Accessions to Library and Map-rooms, with List of Donors .. ..	lv
Instruments lent out. Presentation of Gold Medals .. .. .	xciii
Anniversary Address; by the Earl de Grey and Ripon .. .. .	c

[N.B. The Authors are alone responsible for the contents of their respective papers.]

ARTICLES.	PAGE
1.—Journey to Mexico. By CH. SEVIN, Esq., F.R.G.S. .. .. .	1
2.—Excursion to an Ancient Volcano in Mexico. By HENRY DE SAUSSURE .. .. .	53
3.—Some Account of the Lake of Yojoa or Taulebé, in Honduras, Central America. By E. G. SQUIER, Esq., of the United States of America .. .. .	58
4.—Explorations in Ecuador in the years 1856 and 1857. By GEORGE JAMES PRITCHETT, Esq. .. .. .	64
5.—Notes of a Voyage up the Yang-tze or Ta-Kiang, from Wusung to Han-kow. By LAURENCE OLIPHANT, Esq., F.R.G.S.; with Chart of the River by Captain SHERARD OSBORN, R.N., F.R.G.S., &c. ..	75
6.—Ascent of the Yang-tze-Kiang. By WILLIAM BLACKNEY, R.N. ..	93
7.—On a New Projection of the Sphere. By Sir J. F. W. HERSCHEL, Bart., K.H., D.C.L., F.R.S., &c. &c. .. .. .	100
8.—Description of the Projection used in the Topographical Department of the War Office for Maps embracing large portions of the Earth's Surface .. .. .	106
9.—A General Historical Description of the State of Human Society in Northern Central Africa. By H. BARTH, Phil. D. .. ..	112
10.—Killimandjaro and the White Nile. By JAMES MACQUEEN, Esq., F.R.G.S. .. .. .	128
11.—Journeys of Silva Porto with the Arabs from Benguela to Ibo and Mozambique through Africa. Nov. 26th, 1852, to January 22nd, 1853, and from June 9th, 1853, to August, 1854. By JAMES MACQUEEN, Esq., F.R.G.S. .. .. .	136
12.—Journey of Galvao da Silva to Manica Gold Fields, &c., in 1788, with Description of the Country South of the Lower Zambeze. By JAMES MACQUEEN, Esq., F.R.G.S. .. .. .	155

ARTICLES.	PAGE
13.—Journey of João Francisco from Massomedes to Caemdo in 1841. By JAMES MACQUEEN, Esq., F.R.G.S. . . . .	161
14.—Notes on the Lower Danube. By Major J. STOKES, R.E. . . . .	162
15.—Notes of a Voyage to New Guinea. By ALFRED R. WALLACE, Esq., F.R.G.S. . . . .	172
16.—Travels in Siam and Cambodia. By D. O. KING, Esq. . . . .	177
17.—Notes on the Antiquities, Natural History, &c. &c., of Cambodia, compiled from Manuscripts of the late E. F. J. FORREST, Esq., and from information derived from the Rev. Dr. HOUSE, &c. &c. By JAMES CAMPBELL, Esq., Surgeon R.N., F.R.G.S. . . . .	182
18.—Diary of a Journey with Sir Eyre Coote from Bussora to Aleppo, in 1780 (?), from the original MS. . . . .	198
19.—Journey in the Yóruba and Núpe Countries in 1858. By DANIEL J. MAY, Esq., F.R.G.S., Second Master R.N. . . . .	212
20.—Memoranda of a Trading Trip into the Orange River (Sovereignty) Free State, and the Country of the Transvaal Boers, 1851-52. By JOHN SANDERSON, Esq. . . . .	233
21.—Account of Ghadamis. By C. H. DICKSON, Esq., F.R.G.S., H.B.M. Consul at Sukum Kalé . . . . .	255
22.—Notes to Accompany the Map of St. Helena. By Major EDMUND PALMER, R.A., F.R.G.S. . . . .	260
23.—Progress of the British North American Exploring Expedition. Under the command of Capt. JOHN PALLISER, F.R.G.S. . . . .	267
24.—On Instruments and Observations for Longitude for Travellers on Land. By Col. G. EVEREST, V.P.R.G.S., &c. &c. . . . .	315
INDEX . . . . .	325

## ILLUSTRATIONS.

1. SEVIN . . . . .	Journey in Mexico . . . . .	1
2. SQUIER . . . . .	Lake Yojoa, in Honduras . . . . .	58
3. PRITCHETT . . . . .	Explorations in Ecuador . . . . .	64
4. OLIPHANT . . . . .	Voyage up the Yang-tze . . . . .	76
4. BLACKNEY . . . . .	„ „ . . . . .	93
5. } HERSCHEL . . . . .	New Projection of the Sphere . . . . .	{ 104
6. }		{ 106
7. JAMES . . . . .	Projection . . . . .	111
8. BARTH . . . . .	Society in North Africa . . . . .	112
9. MACQUEEN . . . . .	Central Africa . . . . .	136
10. STOKES . . . . .	Lower Danube . . . . .	162
11. KING . . . . .	Cambodia . . . . .	178
12. MAY . . . . .	Yóruba and Núpe . . . . .	212
13. SANDERSON . . . . .	Orange River Free States . . . . .	234
14. DICKSON . . . . .	Ghadamis . . . . .	257
15. PALLISER . . . . .	British North America . . . . .	268

# Royal Geographical Society.

1860.

## REPORT OF THE COUNCIL,

READ AT THE ANNIVERSARY MEETING ON THE 28TH MAY.

THE Council have much pleasure in submitting to the Society the accounts of the past year, and the customary notice of progress.

*Members—Ordinary, Honorary, and Corresponding.*—Since the last Anniversary 182 Fellows have been elected; and, upon the recommendation of the Council, one Corresponding Member—Professor Otto Struve, of the Imperial Observatory of Pulkowa, St. Petersburg. During the same period the Council have to record the loss of 21 Fellows, and one Honorary Member—Professor Carl Ritter of Berlin.

The Society now consists of 1316 Fellows, and 57 Honorary and Corresponding Members.

*Finances.*—The Balance-sheet annexed shows a satisfactory increase of income; whilst the disbursements, under every head of expenditure save that of Publications, have been kept strictly within the estimates submitted to the last General Meeting.

The permanent fund of the Society at the close of the year amounted to 4000*l*. New 3 per Cents., to which has since been added a farther investment of 500*l*.

*Publications.*—The 29th volume of the Society's Journal (containing the narrative of Captain Burton's latest African researches) is now ready for delivery. The 3rd volume of 'Proceedings' has been completed, and No. 1 of volume 4 issued to the Fellows.

Copies of these publications are presented to the chief public Institutions at home and abroad.

*Map-Rooms.*—The accessions to this department since the last Anniversary consist of 5217 Maps and Charts, all of which have been arranged in due geographical order. The following may be specially noticed :—Ordnance Maps of England, Wales, Scotland, and Ireland, on various scales ; Charts by the Hydrographic Department of the Admiralty, and by the Dépôt de la Marine of France ; Government Maps of Belgium, Denmark, Sweden and Norway, Sardinia, and Holland ; Papen's Central Europe, by Ravenstein ; Trigonometric Survey of India (11 sheets) ; North-Eastern provinces of China ; Tasmania, by J. Sprent, Surveyor-General ; Charts of the Coast of South Australia, and Sailing Directions, by B. Douglas, Esq., Trinity House, Adelaide ; Keith Johnston's Australia, published by E. Stanford ; and Queensland, by L. F. Landsberg. The United States, by Lieutenant Warren, U.S. Secretary-at-War ; Lake Superior and Red River Settlement, by S. S. Dawson ; Arrowsmith's Arctic Regions ; Canada, by Devine ; Algemeene Atlas van Nederlandsch Indië, by Baron van Carnbée, and Maps of Java, MS., on parchment, presented by General Wetherall ; also Atlases to date by Fullarton, Blackie, Johnston, etc.

*Instruments.*—In order to obtain for the use of scientific travellers an approved class of Instruments, for determining geographical positions, the Council have agreed to offer "a Prize of 50*l.*, or a Gold Medal, to the designer or maker of the most serviceable Reflecting Instrument for the Measurement of Angles." A specification of the conditions of this prize may be had at the offices of the Society.

*Library.*—Considerable additions have been made in this department by presentation and purchase, the former comprising 623 books and pamphlets, and the latter upwards of 260 volumes. Among these may be enumerated Purchas' 'Pilgrimes,' in 5 vols. folio, a rare and perfect copy, presented by Mr. John Crawford, F.R.G.S. ; Worcester's large 'Dictionary of the English Language ;' Oliphant's 'Narrative of Lord Elgin's Mission to China and Japan ;' M'Leod's 'Travels in Eastern Africa ;' Richardson's 'Travels in Morocco ;' Holden's 'History of Natal ;' Lyell's 'Travels in North

America ;' Demidoff's 'Russia and the Crimea ;' Crawford's 'Embassy to Ava ;' Abbé Domenich's 'Missionary Adventures in Texas and Mexico ;' Hayes' 'Arctic Boat Journey ;' Parker's and Hughes' 'Manual of Geography ;' Reports of Geological Surveys in Canada and India ; and the Transactions of the principal literary and scientific Institutions throughout the world.

*Expeditions.*—The results of the important explorations of Captain M'Clintock in the Arctic Seas, Captains Burton and Speke in the Lake regions of Central Africa, and Captain Palliser in North America have been duly reported to the Society ; and the 'Proceedings' contain interesting communications from highly esteemed travellers in various parts of the world. An expedition, aided by a liberal grant from Government, is now in progress under Captains Speke and Grant, to follow up the recent explorations in Central Africa, north of Lake Nyanza, whilst the enterprising Livingstone continues his researches in the Shirwa and Nyassa Lake districts. Further explorations have also been recently made in Western Australia and British Columbia.

*Royal Premium.*—The Founder's or King William Gold Medal has been awarded to Lady Franklin, for her self-sacrificing perseverance in sending out expeditions to ascertain the fate of her husband and the ships under his command, and in commemoration of the discoveries of the illustrious navigator Franklin ; and the Patron's or Victoria Gold Medal to Captain Sir F. L. M'Clintock, for the skill and fortitude displayed by him and his companions—Hobson, Young, and Walker—in their successful search for records of the lost expedition, and for their valuable coast surveys, by which our acquaintance with Arctic geography has been greatly enlarged.

*House.*—No change has taken place in the arrangements for the Evening Meetings of the Society, which continue to be held at Burlington House, by kind permission of the authorities of the University of London and the Royal Society, to whom the Council desire to express, on their own behalf and on that of the Fellows generally, their grateful acknowledgments.



## BALANCE-SHEET FOR THE YEAR 1859.

*Receipts.**Expenditure.*

	£.	s.	d.		£.	s.	d.
Cash Balances, including Deposit at Interest ..	..	1635	8 5	Publications—Journal and Proceedings ..	..	..	962 8 0
Subscriptions of 738 Fellows ..	..	1467	0 0	Salaries ..	..	..	801 5 0
Compositions of 22 Fellows ..	..	543	0 0	Rent, Taxes, Wages, &c. ..	..	..	668 6 7
Entrance Fees of 155 Fellows ..	..	465	0 0	Office Expenses ..	..	..	280 13 1
Government Annual Grant ..	..	500	0 0	Library and Map Rooms ..	..	..	214 18 1
Arrears of Subscriptions ..	..	104	0 0	East African Expedition ..	..	..	250 0 0
Sale of Publications ..	..	172	1 0	Charter of Incorporation ..	..	..	151 11 8
Interest on Stock and Deposit ..	..	112	11 6	Gold Medals and Chronometer ..	..	..	72 5 0
Royal Premium Grant ..	..	52	10 0	Miscellaneous Charges ..	..	..	7 14 4
Rent of Stables ..	..	40	8 2	Overpaid Subscriptions returned ..	..	..	14 2 0
Subscriptions overpaid ..	..	15	5 0	Investments, 1000 <i>l.</i> New 3 per Cents. ..	..	..	950 0 0
				Balance nt Banker's ..	..	£ 117 3 4	
				Cash in Office ..	..	16 17 0	
							£ 4507 4 1

ROBERT BIDDULPH, *Treasurer.*Audited, and found correct.  
15, Whitehall Place, 7th May, 1860.THOS. H. BROOKING, }  
E. OSBORNE SMITH, } *Auditors.*

ESTIMATE FOR THE YEAR 1860.

*Receipts.*

*Expenditure.*

	£.	s.	d.		£.	s.	d.
Annual Subscriptions .. .. .	1500	0	0	Journal and Proceedings .. .. .	1000	0	0
Life Compositions .. .. .	450	0	0	Salaries .. .. .	800	0	0
Entrance Fees .. .. .	300	0	0	Rent, Wages, Lights, &c. .. .. .	700	0	0
Arrears of Subscriptions .. .. .	100	0	0	Library and Map Rooms .. .. .	350	0	0
Sale of Publications .. .. .	150	0	0	East African Expedition .. .. .	2500	0	0
Royal Premium Grant .. .. .	52	10	0	Royal Premiums .. .. .	52	10	0
Government Annual Grant .. .. .	500	0	0	Premium for Instruments .. .. .	50	0	0
Government Special Grant—East African Expedition .. .. .	2500	0	0	Office Expenses .. .. .	300	0	0
Dividends on Stock .. .. .	120	0	0	Sundries for Balance .. .. .	54	0	0
Cash Balance, 1st January, 1860 .. .. .	134	0	0				
	£5806	10	0		£5806	10	0

NORTON SHAW, *Acting Secretary.*

## Library Regulations.

---

I. The Library will be open every day in the week (Sundays excepted) from *Eleven* in the morning to *Five* in the afternoon,\* except on New-Year's Day, Good Friday to Easter Monday inclusive, and Christmas week, and it will be closed one month in the year, in order to be thoroughly cleaned, viz. from the first to the last day of September.

II. Every Fellow of the Society is entitled *(subject to the Rules)* to borrow as many as four volumes at one time.

*Exceptions :—*

1. Dictionaries, Encyclopædias, and other works of reference and cost, Minute Books, Manuscripts, Atlases, Books and Illustrations in loose sheets, Drawings, Prints, and unbound Numbers of Periodical Works, *unless with the special written order of the President.*
2. Maps or Charts, *unless by special sanction of the President and Council.*
3. New Works before the expiration of a month after reception.

III. The title of every Book, Pamphlet, Map, or Work of any kind lent, shall first be entered in the Library-register, with the borrower's signature, or accompanied by a separate note in his hand.

IV. No work of any kind can be retained longer than one month; but at the expiration of that period, or sooner, the same must be returned free of expense, and may then, upon *re-entry*, be again borrowed, provided that no application shall have been made in the mean time by any other Fellow.

V. In all cases a list of the Books, &c., or other property of the Society, in the possession of any Fellow, shall be sent in to the Secretary *on or before the 1st of July in each year.*

VI. In every case of loss or damage to any volume, or other property of the Society, the borrower shall make good the same.

VII. No stranger can be admitted to the Library except by the introduction of a Fellow, whose name, together with that of the Visitor, shall be inserted in a book kept for that purpose.

VIII. Fellows transgressing any of the above Regulations will be reported by the Secretary to the Council, who will take such steps as the case may require.

By Order of the Council,

NORTON SHAW.

---

\* On Saturday the Library is closed at 3 P.M.

# ROYAL GEOGRAPHICAL SOCIETY.

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THE QUEEN.

**Vice-Patron.**

H. R. H. PRINCE ALBERT.

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(ELECTED 28TH MAY, 1860.)

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MADOZ, Don Pascual . . . . . Madrid	

## F E L L O W S.

(To OCTOBER 1, 1860.)

N.B.—Those having \* preceding their names have compounded for life.  
Those having † have requested to be placed on the list as abroad.

Year of  
Election.

- |      |   |
|------|---|
| 1830 | Aberdeen, George, Earl of, K.G., K.T., M.A., F.R.S. <i>Argyll-house, Argyll-st., W.; and Huddo-house, Aberdeen.</i>                           |
| 1855 | ● Acland, Prof. Henry Wentworth, M.D. <i>Oxford.</i>  |
| 1853 | Acland, Sir Peregrine Palmer F. P., Bart. <i>Fairfield, Somerset.</i>   |
| 1830 | *Acland, Sir Thomas Dyke, Bart., F.R.S. <i>Waterloo-hotel, Jermyn-street, S.W.; and Killerton, Exeter, Devon.</i>                             |
| 1860 | Agnew, Sir Andrew, Bart., M.P. 21, <i>Upper Grosvenor-street, W.; and Loch-naw Castle, Wigtownshire.</i>                                      |
| 1859 | Ainslie, Col. Francis H. <i>Junior United Service Club, S.W.; and Burlington Chambers, 180, Piccadilly, W.</i>                                |
| 1830 | *Ainsworth, W. Francis, Esq., F.S.A. <i>Ravenscourt-villa, New-rd., Hammersmith, W.</i>   |
| 1857 | Airey, John Moore, Esq.   |
| 1859 | Airlie, David Graham, Earl of. <i>Holly-lodge, Kensington, W.</i>   |
| 1860 | 10 Aitchison, David, Esq. <i>Parthenon Club, S.W.</i>   |
| 1830 | *Albemarle, George Thomas, Earl of. 36, <i>Great Cumberland-place, W.; Quid-denham-hall, Larkingford, Norfolk; and Elvedon-hall, Suffolk.</i> |
| 1834 | *Alcock, Thomas, Esq., M.P. <i>Kingswood-warren, near Epsom, Surrey.</i>  |
| 1838 | *Aldam, William, Esq. <i>Frickley-hall, near Doncaster.</i>   |
| 1857 | Aldrich, Commander Robert D., R.N. <i>H.M.S. 'Monarch,' Sheerness.</i>  |
| 1830 | Alexander, Colonel Sir Jas. Ed., K.L.S., F.R.A.S., etc., 14th Regt. <i>United Service Club, S.W.; and Fermoy, Ireland.</i>                    |
| 1857 | Alexander, M. General, R.A. <i>Blackheath-park, S.E.</i>  |
| 1855 | Alger, John, Esq. 16, <i>Oakley-square, N.W.</i>  |
| 1857 | Allan, George W., Esq. <i>Toronto, Canada.</i>  |
| 1858 | Allan, Jas., Esq. 122, <i>Leadenhall-street, E.C.</i>   |
| 1835 | 20*Allen, Capt. Wm., R.N., F.R.S. <i>Athenæum Club, S.W.; and 7, Russell-st., Bath.</i>   |
| 1859 | Alsager, Thos. H., Esq. <i>Reform Club, S.W.; and Chislehurst, Kent.</i>  |
| 1859 | Ancell, Henry, Esq. 3, <i>Norfolk-crescent, Hyde-park, W.</i>   |
| 1854 | Ancona, J. S., Esq. 8, <i>John-street, Adelphi, W.C.</i>  |
| 1860 | Anderson, John Edmund, Esq.   |
| 1856 | *Andrew, William P., Esq. 26, <i>Montagu-square, W.</i>   |
| 1860 | *Anson, Sir John William Hamilton, Bart. 55, <i>Rutland-place, W.</i>   |
| 1853 | Ansted, Prof. D. T., M.A., F.R.S., etc. <i>Athenæum Club, S.W.; and Bonair St. Martin, Guernsey.</i>  |
| 1857 | Anstruther, Lt.-Col. Philip, C.B. <i>Mulras Artillery, 1, Chapel-st., Grosvenor-place, S.W.</i>   |

Year of Election.	
1830	*Antrobus, Sir Edmund, Bart. 146, <i>Piccadilly, W.</i> ; <i>Lower Cheam, Epsom, Surrey</i> ; and <i>Amesbury, Wilts.</i>
1857	30 Arbuthnot, Coutts T., Esq.
1858	Arbuthnot, George, Esq. 23, <i>Hyde-park-gardens, W.</i>
1860	Arcebeckne, Andrew, Esq. 35, <i>Albemarle-street, W.</i>
1860	Archer, W. H. D., Esq., of Tasmania. 32, <i>Duke-street, St. James's, S.W.</i>
1855	*Arden, Richard Edward, Esq. <i>Sunbury-park, Middlesex, S.W.</i>
1858	*Armistead, Rev. Chas. John, Chaplain R.N., F.S.A. <i>Hong Kong.</i>
1857	Armstrong, Alexander, Esq., M.D., R.N., Deputy Inspector-General Royal Naval Hospital, Malta. <i>Junior United Service Club, S.W.</i>
1830	*Arrowsmith, John, Esq., F.R.A.S. 10, <i>Soho-square, W.</i>
1859	Ashburton, William Bingham, Lord, F.R.S. <i>Bath House, Piccadilly, W.</i> ; and <i>The Grange, Alresford, Hants.</i>
1856	Ashwell, the Rev. Arthur Rawson, M.A., Principal of Oxf. Dioc. Training College. <i>The College, Culham, Oxon.</i>
1853	40*Ashwell, James, Esq., M.A., F.G.S.
1851	Astley, Francis D. P., Esq., M.R.I. 67, <i>Eaton-square, S.W.</i>
1830	*Atkins, John Pelly, Esq., F.S.A. <i>Halsted-house, near Sevenoaks.</i>
1858	Atkinson, Thomas W., Esq. <i>Hawk-cottage, Old Brompton, S.W.</i>
1860	Attwell, Professor Henry. <i>Barnes, S.W.</i>
1839	Attwood, Matthias Wolverley, Esq. 27, <i>Gracechurch-street, E.C.</i>
1859	Austen, Capt. H. H. Godwin, 24th Foot, Trig. Survey, Panjab. <i>Junior United Service Club, S.W.</i> ; and <i>Chilworth Manor, Guilford, Surrey.</i>
1854	Ayrton, Acton S., Esq., M.P. 24, <i>Grafton-street, Bond-street, W.</i>
1845	*Ayrton, Frederick, Esq. <i>Egypt.</i>
1857	Aytoun, R. Sinclair, Esq. <i>Inchdairnie, Fife.</i>
1836	50*Back, Rr. Adm. Sir Geo., D.C.L., F.R.S. 109, <i>Gloucester-place, Portman-sq., W.</i>
1859	Baikie, Robert, Esq., M.D. <i>Oriental Club, W.</i>
1855	Baikie, Wm. Balfour, Esq., M.D., R.N. <i>Niger Expedition. Brunswick-cottage, Forton-road, Gosport.</i>
1859	Bailey, L. C., Esq., R.N. <i>Topographical Department, New-street, Spring-gardens, S.W.</i>
1834	*Baillie, David, Esq., F.R.S. 14, <i>Belgrave-square, S.W.</i> ; and <i>Hill-park, Surrey.</i>
1857	Baillie, Capt. John, 26th Bengal Native Infantry. 14, <i>St. James's-square, S.W.</i>
1857	†Baines, Thomas, Esq. <i>Cape of Good Hope</i> ; and 14, <i>Union-street, Lynn Regis.</i>
1855	†Baker, Capt. Wm. T., 85th Regt. <i>Graham Town, South Africa</i> ; and 31, <i>Grostenor-place, Bath.</i>
1847	Balfour, Lieut.-Colonel George, M.A. <i>East Indies.</i>
1853	Balfour, John C. B., Esq. <i>New South Wales</i> ; and <i>Colinton, Moreton Bay.</i>
1860	60 Ball, John, Esq. 18, <i>Park-street, Westminster, S.W.</i>
1852	Bancroft, Capt. W. C., 16th Regt. <i>Aide de Camp and Military Sec., King's House, Jamaica</i> ; <i>McGregor and Co., Charles-street, S.W.</i>
1858	Banneiman, Sir Alexander, Bart. 24, <i>Grafton-street, Bond-street, W.</i> ; and <i>Crimmojate, Aberdeenshire.</i>

Year of Election.	
1840	*Barclay, Arthur Kett, Esq., F.R.S. <i>Park-street, Southwark, S.E.; and Bury-hill, Dorking, Surrey.</i>
1852	Barclay, David, Esq. <i>Eastwick-park, Surrey.</i>
1838	Baring, Rt. Hon. Sir Francis T., Bart., M.P., F.R.S. <i>Stratton-ph., Andover, Hants.</i>
1858	Baring, The Hon. Francis. 16, <i>St. James's-square, S.W.</i>
1835	*Baring, John, Esq. <i>Oakwood, Chichester.</i>
1844	*Baring, Thomas, Esq., M.P. 41, <i>Upper Grosvenor-street, W.</i>
1853	Barnett, Capt. Edward, R.N. 14, <i>Woburn-square, W.C.</i>
1858	70 Barratt, James, Esq. <i>Lymæ Hall, near Harrington, Cheshire.</i>
1859	Barrington, the Hon. George.
1854	†Barros, Don José Antonio. <i>Santamartha, New Granada.</i>
1833	Barrow, John, Esq., F.R.S., F.S.A. 17, <i>Hanover-terrace, Regent's-park, N.W.</i>
1856	Barth, Heinrich, Esq., PH. DR. <i>Berlin.</i>
1857	Bartholomew, John, Junr., Esq. 4, <i>North Bridge, Edinburgh.</i>
1837	*Bateman, James, Esq., F.R.S., L.S. <i>Knyppersley-hall, Staffordshire.</i>
1859	Bateman, John F., Esq., C.E. 16, <i>Great George-street, Westminster, S.W.</i>
1852	*Bates, Josh., Esq. 21, <i>Arlington-st., Piccadilly, W.; and East Sheen, Surrey, S.W.</i>
1858	Baxendale, Joseph H., Esq. 14, <i>Chester-terrace, Regent's-park, N.W.; and Scott's-bridge, near Rickmansworth, Herts.</i>
1852	80 Beardmore, Nathaniel, Esq., C.E. 30, <i>Great George-street, Westminster, S.W.</i>
1857	Beardmore, Septimus, Esq., C.E. 27, <i>Albion-street, Hyde-park, W.</i>
1858	Beaucherk, Aubrey de Vere, Esq. <i>Ardglass, Co. Belfast.</i>
1854	†Beaufort, William Morris, Esq., Bengal Civil Service. <i>Bengal.</i>
1856	Beaumont, John Aug., Esq. <i>Melrose-hall, Putney-heath, S.W.; and 50, Regent-street, W.</i>
1851	*Beaumont, Wentworth B., Esq., M.P. 144, <i>Piccadilly, W.; Bywell-hall, Newcastle-upon-Tyne; and Bretton-park, Wakefield.</i>
1830	Becher, Capt. Alex. B., R.N. <i>Admiralty, S.W.; and 13, Dorset-place, Dorset-sq., N.W.</i>
1838	*Beckford, Francis, Esq. <i>Travellers' Club.</i>
1854	Bedford, Commander Edward James, R.N. <i>Oban, N.B.</i>
1859	Bedford, Capt. G. Augustus, R.N. 31, <i>Royal-crescent, Notting-hill, W.</i>
1855	90 Beddingfeld, Commander Norman B., R.N. 1, <i>James-street, Adelphi, W.C.</i>
1846	Beke, Charles Tilstone, Esq., PH. DR., F.S.A., &c. <i>Bekesburne, near Canterbury; and Cambridge Heath, Hackney, N.E.</i>
1853	Belcher, Rev. Brymer. <i>St. Gabriel's, Fimlico, S.W.</i>
1830	*Belcher, Capt. Sir Edward, C.B., F.R.A.S., R.N. <i>Union Club, S.W.</i>
1858	Beldam, Edward, Esq. <i>Lincoln's-inn, W.C.; and Royston, Herts.</i>
1848	Beldam, Joseph, Esq. <i>Royston, Herts.</i>
1858	Bell, C. Davidson, Esq., Surveyor-General, Cape of Good Hope. <i>Cape Town.</i>
1850	*Bell, James, Esq. 1, <i>Devonshire-place, Portland-place, W.</i>
1830	*Bell, James Christian C., Esq. 42, <i>Westbourne-terrace, W.; and 15, Angel-court, Throgmorton-street, E.C.</i>
1830	*Bennett, John Joseph, Esq., F.R.S. <i>British Museum, W.C.</i>



Year of  
Election.

- 1857 100 Bennett, J. Risdon, Esq., M.D. 15, *Finsbury-square, E.C.*  
 1856 \*Benson, Robert, Esq. 16, *Craven-hill-gardens, Bayswater, W.*  
 1856 \*Benson, William, Esq., Barrister-at-Law. 6, *Lincoln's-inn, W.C.; and Oxford and Cambridge Club, Pall Mall, S.W.*  
 1830 Bentham, George, Esq., F.L.S. 91, *Victoria-street, Westminster, S.W.*  
 1833 Bentley, Richard, Esq. *New Burlington-street, W.*  
 1859 Bereus, H. Hulse, Esq. *Hudson Bay House, Fenchurch-street, E.C.*  
 1858 Bernays, Adolphus, Esq., PH. DR., Professor of German. *King's College, W.C.; and 29, Inverness-road, W.*  
 1856 Berry, Josiah, Esq. 16, *Regent-square, W.C.*  
 1842 \*Bethune, R.-Admiral C. R. Drinkwater, C.B. 56, *Westbourne-ter., Hyde-park, W.*  
 1836 Betts, John, Esq. 115, *Strand, W.C.*  
 1860 110 Bidder, Geo. Parker, Esq., President Inst. Civ. Eng. 24, *Great George-st., S.W.; and Mitcham, Surrey.*  
 1845 \*Biddulph, Robert, Esq. 43, *Charing-cross, S.W.; 31, Eaton-place, S.W.; and Ledbury, Herefordshire.*  
 1859 Bigge, Frederick W., Esq. *Union Club, S.W.*  
 1850 Bigsby, John J., Esq., M.D. 89, *Gloucester-place, Portman-square, W.*  
 1858 Birch, Augustus F., Esq., M.A. Assistant Master, Eton College.  
 1858 Birch, John William, Esq. 9<sup>a</sup>, *New Broad-street, E.C.; and 27, Park-street, Grosvenor-square, W.*  
 1859 Birch, Capt. Thomas, R.N. *United Service Club, S.W.*  
 1847 \*Bird, James, Esq., M.D. 27, *Hyde-park-square, W.*  
 1858 Bishop, George, Esq., F.R.A.S. *Union Club; and Bridge-house, Twickenham, S.W.*  
 1836 \*Blaauw, William H., Esq., M.A., F.S.A., F.Z.S. *Beechlands, near Uckfield, Sussex.*  
 1860 120 \*Black, Francis, Esq. 6, *North-bridge, Edinburgh.*  
 1858 Blackett, Henry, Esq. 13, *Great Marlborough-street, W.*  
 1849 Blackie, W. Graham, Esq., PH. DR. 36, *Frederick-street, Glasgow.*  
 1857 Blackstone, Alan C., Esq. *Board of Works, Whitehall-place, S.W.*  
 1851 Blackwell, Thomas Evans, Esq., C.E. *Grand Trunk Railway, Montreal, Canada.*  
 1854 Blaine, D. Robertson, Esq., Barrister-at-Law. 3, *Paper-buildings, Temple, E.C.; and 8, Southwick-place, Hyde-park-square, W.*  
 1857 \*Blake, Wollaston, Esq. 8, *Peronshire-place, W.*  
 1859 Blakeley, Capt. Alexr., B.A.  
 1857 Blakiston, Captain Thomas, R.A. *Royal Artillery Institution, Woolwich, S.E.*  
 1830 \*Blanshard, Henry, Esq., F.R.A.S. 53, *Chancery-lane, W.C.*  
 1857 130 Blanshard, Richard, Esq.  
 1854 Blencowe, W. Robert, Esq. *The Hook, Leves.*  
 1839 \*Blewitt, Octavian, Esq. 73, *Great Russell-street, W.C.*  
 1849 \*Bliss, Rev. Frederick. *Hammoon Rectory, Blandford, Dorset.*  
 1852 Block, Samuel Richard, Esq. *Green-hill, near Whetstone, Herts.*  
 1837 \*Blunt, Jos., Esq. 13, *Austin Friars, E.C.; and Leyden Ho., Mortlake, Surrey.*  
 1858 Bohn, Henry G., Esq. *York-st. Covent-garden, W.C.; and North End House, Twickenham, S.W.*

- Year of Election.
- 1851 Bois, Henry, Esq. 110, *Fenchurch-street, E.C.*
- 1850 Bollaert, Wm., Esq., Corr. Mem. University of Chile. 21<sup>a</sup>, *Hanover-sq., W.*
- 1858 Bonnor, George, Esq. 48, *Pall-mall, S.W.*; and 2, *Boyswater-ter., Kensington-square, W.*
- 1859 140 Booth, Rev. James, LL.D. *The Vicarage, Stone, near Aylesbury.*
- 1859 Borough, Sir Edward, Bart. 4, *Nassau-street, Dublin.*
- 1845 \*Borrer, Dawson, Esq. *Altmont Ballon, Co. Carlow, Ireland.*
- 1856 Botcherby, Blackett, Esq., M.A. 48, *Brompton-row, S.W.*
- 1839 \*Botfield, Beriah, Esq., M.P., F.R.S., F.S.A., F.R.S.N.A. 5, *Grosvener-square, W.*; and *Norton-hall, Daventry, Northamptonshire.*
- 1858 \*Botterill, John, Esq. *Flower Bank, Burley-road, Leeds.*
- 1850 Boustead, John, Esq. 34, *Cruzen-street, Strand, W.C.*
- 1855 Boyet, Charles, Esq. 6, *Belvue Villas, Seven Sisters'-road, Holloway, N.*
- 1854 \*Bowen, Sir George Ferguson, K.C.M.G., M.A. Governor of Queensland, Australia.
- 1836 Bower, George, Esq. 6, *Tokenhouse-yard, E.C.*
- 1833 150 Bowles, Admiral William, C.B. 8, *Hill-street, Berkeley-square, W.*
- 1856 Bowman, John, Esq. 9, *King William-street, E.C.*
- 1854 Bowring, Sir John, LL.D., F.R.S.N.A. *Athenæum Club, S.W.*
- 1845 \*Boyd, Edward Lennox, Esq., F.S.A. 8, *Waterloo-place, Pall-mall, S.W.*
- 1856 Boyne, G. Hamilton-Russell, Viscount. 22, *Belgrave-square, S.W.*; *Bruncr-peth Castle, Durham*; and *Burwarton Hall, Ludlow, Salop.*
- 1851 Bracebridge, Charles Rolt, Esq. *Atherstone, Warwick.*
- 1838 Braddell, Thomas, Esq. *Magistrate at Penang.*
- 1857 Brady, Cheyne, Esq., Barrister-at-Law. 104, *Grafton-street, Dublin.*
- 1857 Bramston, Thomas W., Esq., M.P. *Carlton Club, W.*; and *Skreens, Chelmsford, Essex.*
- 1859 \*Brand, James, Esq. 109, *Fenchurch-street, E.C.*
- 1857 160 Brant, James, Esq. *H.M.'s Consul at Damascus, 39, Mark-lane, E.C.*
- 1857 Brasted, Rev. J. B. 27, *Hampshire-terrace, Southsea, Hants.*
- 1852 Breadalbane, John, Marquis of, K.T., F.R.S. 21, *Park-lane, W.*; and *Taymouth-castle, Aberfeldie.*
- 1845 \*Brent, George Smith, Esq. 1, *Bedford-street, Strand, W.C.*
- 1846 Brereton, Rev. C. D., M.A. *Little Massingham, Rougham, Norfolk.*
- 1833 \*Brereton, Rev. John, LL.D., F.S.A. *Bedford.*
- 1834 \*Breton, William Henry, Esq., Lieut. R.N., M.R.I. 15, *Comden-place, Bath.*
- 1857 Brett, John Watkins, Esq. 2, *Hanover-square, W.*
- 1856 Brewer, Rev. John S., M.A., Professor of English Literature. *King's College, W.C.*; and *Well Walk, Hampstead, N.W.*
- 1858 Bridges, Nathaniel, Esq. 16, *Southwick-crescent, Hyde-park, W.*
- 1852 170 \*Brierly, Oswald W., Esq. 8, *Lidlington-pl., Harrington-sq., Hampstead-rd., N.W.*
- 1860 Bright, John, Esq., M.D. 12, *Cambridge-square, Hyde-park, W.*
- 1857 Brine, Lieut. Bruce, R.E. *Cape of Good Hope.*
- 1854 Brine, Capt. Frederick, R.E. *Army and Navy Club, S.W.*; *Curragh Camp, Ireland*; and *Claremont, Sidmouth.*

## Year of Election.

- 1856 Brine, Lieut. Lindesay, R.N. *Claremont, Sidmouth; and H.M.S. 'Assistance.'*
- 1833 \*Brodie, Sir Benjamin C., Bart., D.C.L., President R.S., &c., Serjeant Surgeon to the Queen. 14, *Savile-row, W.; and Broome-park, Surrey.*
- 1848 Broke, Captain Sir George N., Bart., R.N. *H.M.S. 'Hero,' Sheerness; and Broke-hall, Suffolk.*
- 1856 Brook, Captain William, 30th Regt.
- 1838 Brooke, Sir James, K.C.B., D.C.L. *Athenaeum Club, S.W.*
- 1856 \*Brooking, George Thomas, Esq. 10, *Connaught-square, W.*
- 1856 180 \*Brooking, Marmaduke Hart, Esq. 5, *Norfolk-crescent, Hyde-park, W.*
- 1843 \*Brooking, Thomas Holdsworth, Esq. 14, *New Broad-street, City, E.C.; and 5, Norfolk-crescent, Hyde-park, W.*
- 1850 Broughton, John, Lord, G.C.B., M.A., F.R.S. 42, *Berkeley-square, W.; and Erlestoke-park, Westbury, Wilts.*
- 1859 Broughton, L. P. Delves, Esq. 2, *Tanfield-court, Temple, E.C.*
- 1856 \*Brown, Daniel, Esq. *The Elms, Larkhall-rise, Clapham, S.*
- 1860 Brown, James, Esq., M.P. *Rossington, Yorkshire.*
- 1837 Brown, John, Esq., F.R.S.N.A. 3, *Newcastle-place, Clerkenwell, E.C.; and Scaleby Lodge, Camden-road, N.*
- 1856 \*Brown, Samuel, Esq. 11, *Lombard-st., E.C.; and The Elms, Larkhall-rise, Clapham, S.*
- 1858 \*Brown, Thomas, Esq. 8, *Hyde-park-place West, W.*
- 1859 Brown, William, Esq. *Loat's-road, Clapham-park, S.*
- 1858 190 Browne, John H., Esq. *Port Gawler, S. Australia*
- 1858 Browne, William J., Esq. *Port Gawler, S. Australia.*
- 1852 Browning, Henry, Esq., M.R.I. 72, *Grosvenor-street, W.; and Ampton-hall, Bury St. Edmund's.*
- 1856 \*Browning, Thomas, Esq. 6, *Whitehall, S.W.*
- 1859 Bruce, Henry Austin, Esq., M.P. 2, *Little Ryder-street, S.W.*
- 1856 Bryant, Walter, Esq., F.R.C.S. 7, *Bathurst-street, Hyde-park-gardens, W.*
- 1844 Bryden, William, Esq. 4, *New Palace-yard, Westminster, S.W.*
- 1843 \*Buchan, John H., Esq. *Mexico.*
- 1859 Buckland, Edward C., Esq. 11, *Lansdowne-road, Notting-hill, W.*
- 1830 \*Bullock, Rear-Admiral Frederick. *Woolwich, S.E.*
- 1860 200 \*Bunbury, Sir Charles James Fox, Bart. *Barton-hall, Bury St. Edmund's.*
- 1839 Bunbury, E. H., Esq., M.A. 15, *Jermyn-street, S.W.*
- 1860 Bunyon, C. J., Esq. 4, *Queen's-terrace, Queen's-gate, Kensington-gore, W.*
- 1858 Burmester, Edward, Esq. *St. Helen's-place, E.C.; and Springwell, Clapham-common, S.*
- 1830 \*Burney, Ven. Archd. Charles Parr, D.D., F.R.S., F.S.A. *Rectory-house, Bishop's Wickham, Esser.*
- 1857 Burstall, Commander E., R.N. 6, *Park-villas, Lower Norwood, S.*
- 1830 \*Burton, Alfred, Esq. 36, *Marina, St. Leonard's.*
- 1833 \*Burton, Decimus, Esq., F.R.S. 6, *Spring-gardens, S.W.; and St. Leonard's-cottage, Hastings.*
- 1859 \*Burton, Capt. Richd. Fras., 18th Regt. Bombay N.I. 14, *St. James's-square, S.W.*

Year of Election.	
1858	Bury, William Coutts, Viscount, M.P. 48, <i>Rutland-gate, S. W.</i>
1859	210 Butler, Edward, Esq. <i>Lansdowne-road, Hyde-park, W.</i>
1860	*Butler, Rev. Thomas. <i>Rector of Langar, Nottinghamshire.</i>
1858	*Buxton, Sir Thomas Fowell, Bart. <i>Brick-lane, N.E.</i>
1851	Bynoe, Benjamin, Esq., Surgeon R.N.
1854	Byron, the Hon. Frederic. 48, <i>Eaton-place, S. W.</i> ; and <i>Langford, Maldon, Essex.</i>
1830	*Cabbell, B. B., Esq., M.A., F.R.S., F.S.A. 1, <i>Brick-court, Temple, E.C.</i> ; 52, <i>Portland-place, W.</i> ; and <i>Aldrick, Sussex.</i>
1857	*Caldwell, Capt. Henry, R.N. <i>H.M.S. 'Mersey,' Portsmouth</i> ; and 3, <i>Audley-square, W.</i>
1855	*Calthorpe, the Hon. F. H. Gough, M.P. 33, <i>Grosvenor-square, W.</i>
1854	Calvert, Frederic, Esq., Q.C. 9, <i>St. James's-place, S. W.</i> ; and 8, <i>New-square, Lincoln's-inn, W.C.</i>
1830	*Camden, George Charles, Marquis, K.G., D.C.L., M.A. <i>Wilderness-park, Sevenoaks, Kent</i> ; and <i>Bayham-abbey, Sussex.</i>
1858	220 Cameron, Capt. Charles D. <i>Vice-Consul, Redout Kalé, Mingrelia.</i>
1858	Cameron, Major-General Duncan Alexander, R.E. C.B., Vice-Pres. Council of Military Education. <i>Edinburgh.</i>
1844	*Campbell, James, Esq. <i>Groce House, Hendon, Middlessex</i> ; and 8, <i>Park-street, Grosvenor-square, W.</i>
1857	†Campbell, James, Esq., Surgeon, R.N. <i>Bangkok, Siam</i> ; and <i>Luss, Dumbartonsh.</i>
1834	*Campbell, James, Esq., jun., M.R.I. <i>Hampton Court-green, S. W.</i>
1857	Camps, William, Esq., M.D. 40, <i>Park-street, Grosvenor-square, W.</i>
1857	Cannon, Lieut.-General P. 10, <i>Kensington-gardens-terrace, Hyde-park, W.</i>
1853	*Cardwell, Right Hon. Edward, M.P. 74, <i>Eaton-square, S. W.</i>
1857	Carnarvon, Henry Earl of. <i>Highclere-castle, near Newbury.</i>
1857	Cartwright, Col. Henry, Grenadier Guards, M.P. 46, <i>Park-st., Grosvenor-sq., W.</i>
1830	230*Cartwright, Samuel, Esq., F.R.S., F.S.A. 32, <i>Old Burlington-street, W.</i> ; and <i>Nizell's-house, Tonbridge.</i>
1860	Carver, the Rev. Alfred J., Master of Dulwich College. <i>Dulwich, S.</i>
1858	Casella, Louis P., Esq. 23, <i>Hatton-garden, E.C.</i> ; and <i>South-grove, Highgate, N.</i>
1860	Caulfield, Colonel James Molynex. 23, <i>Bruton-street, Berkeley-square, W.</i>
1857	Cave, Capt. Laurence Trent. 23, <i>Lowndes-street, Belgrave-square, S. W.</i>
1858	Cave, Stephen, Esq., M.P. 35, <i>Wilton-place, S. W.</i>
1844	*Chadwick, Hugo Mavesyn, Esq. <i>New Hall, near Sutton-Coldfield.</i>
1857	Chalmers, Alexander Thomson, Esq., M.D.
1858	Champion, John Francis, Esq. 9, <i>Canterbury-villas, Brixton, S.</i>
1855	Chapman, John, Esq. 124, <i>Pall Mall, S. W.</i> ; and 2, <i>Leadenhall-street, E.C.</i>
1834	240*Chapman, Capt. John James, R.A. 33, <i>Adelaide-square, Bedford.</i>
1855	Cheshire, Edward, Esq. <i>Conservative Club, St. James's-street, S. W.</i>
1858	Chesney, Capt. C. Cornwallis, R.E. <i>Prof. Military History, R. M. College, Sandhurst.</i>
1838	*Chesney, Major-General Francis Rawdon, R.A., D.C.L., F.R.S. <i>Athenæum Club S. W.</i> ; and <i>Ballyardle, Kilkeel, Down, Ireland.</i>
1858	Chetwode, Augustus L., Esq. 2, <i>Little Ryder-street, S. W.</i> ; and <i>Chilton House, Thame, Oxfordshire.</i>

Year of  
Election.

- 1858 Childers, Hugh C. E., Esq. 24, *Curzon-street, May-fair, W.*; *Little Bounds, Tunbridge Wells*; and *Australia*.
- 1856 Childers, John Walbanke, Esq. *Cantley Hall, near Doncaster*.
- 1857 \*Chimmo, Lieut. William, R.N. *Skye Island*; and *Admiralty, S.W.*
- 1850 Christmas, Rev. H., M.A., D.C.L., F.R.S., F.S.A. 30, *Manor-street, Clapham, S.*
- 1854 Christy, Henry, Esq. 103, *Victoria-street, S.W.*; and *Woodbines, near Kingston, Surrey, S.W.*
- 1854 250 \*Church, J. W., Esq., B.A. *United University Club, S.W.*; and *Woodside, Hatfield*.
- 1830 \*Church, W. H., Esq.
- 1849 Churchill, Lord Alfred Spencer, M.P. 16, *Rutland-gate, S.W.*
- 1856 Churchill, Charles, Esq. 29, *Sussex-square, Hyde-park, W.*
- 1853 Clarendon, George William, Earl of, K.G., G.C.B. 1, *Grosvenor-crescent, S.W.*; *The Grove, Wutford, Herts*; and *Hindon, Wilts.*
- 1852 Clark, Daniel, Esq. 49, *Milner-square, Islington, N.*
- 1840 \*Clark, Sir James, Bart., M.D., F.R.S. 22 b, *Brook-street, W.*
- 1851 Clark, Rev. Samuel, M.A. *Principal of the Training College, Battersea, S.W.*
- 1859 Clarke, Capt. A., R.E. *Army and Navy Club, S.W.*
- 1860 Clarke, Rev. Joseph W., M.A., Chaplain R.N. *H.M.S. 'Hannibal.'*
- 1859 260 Clarke, Samuel, Esq., C.E. 12, *Upper Brook-street, Ipswich*.
- 1855 \*Clarke, Rev. W. B., M.A. *St. Leonard's, Sydney, New South Wales*.
- 1859 Clarke, Rev. W. Geo., M.A. *Trinity College, Cambridge*.
- 1842 \*Clavering, Sir William Aloysius, Bart. *United University Club, Pall-Mall East, S.W.*; and *Arxell-park, near Gateshead*.
- 1860 Clerk, Capt. Claude. 11, *Prince's-terrace, Prince's-gate, Hyde-park, W.*
- 1830 \*Clerk, Rt. Hon. Sir George, Bart., D.C.L., F.R.S., &c. *Pennicuik-house, Edinburgh*.
- 1858 Clermont, Thomas, Lord. *Ravensdale-park, Flurry-bridge, Ireland*.
- 1858 Clifford, Charles Cavendish, Esq., M.P. 92, *Eaton-square, S.W.*
- 1856 Clive, Rev. Archer. *Whitfield, Hereford*.
- 1854 Clowes, George, Esq. *Duke-street, Stamford-street, Blackfriars, S.*; and 89, *Westbourne-terrace, W.*
- 1854 270 Clowes, Wm., Esq. 31, *Gloucester-ter., Hyde-park, W.*; and *Banstead, Surrey*.
- 1852 Cobbold, John Chevallier, Esq., M.P. *Athenaum Club, S.W.*; and *Ipswich, Suffolk*.
- 1859 Cochrane, Capt. the Hon. A., R.N., C.B. *Junior United Service Club, S.W.*
- 1859 Cocks, Colonel C. Lygon, Coldstream Guards. *Treverbyn-Vean, near Liskeard*.
- 1841 \*Cocks, Reginald T., Esq. 43, *Charing-cross, S.W.*; and 22, *Hertford-street, May-fair, W.*
- 1857 Coghlan, Edward, Esq. *Training Institution, Gray's-inn-road, W.C.*
- 1838 Colchester, Charles, Lord, Rear-Admiral, D.C.L. 34, *Berkeley-square, W.*; and *Kidbrooke, Sussex*.
- 1853 Cole, John Griffith, Esq., M.A., M.R.I. 8, *Charles-street, Berkeley-square, W.*
- 1841 \*Colebrooke, Sir Thomas Edward, Bart., M.P., F.R.A.S. 37, *South-st., Park-lane, W.*
- 1834 Colebrooke, Lt.-General Sir Wm., R.A., M.G., C.B., K.H., F.R.A.S. *Datchet, near Windsor*; and *United Service Club, S.W.*
- 1854 280 Coleman, Everard Home, Esq., F.R.A.S. *Registry and Record Office, Adelaide-place, London Bridge, E.C.*

Year of Election.	
1848	Coles, Charles, jun., Esq. 86, <i>Great Tower-street, E.C.</i>
1835	*Collett, William Rickford, Esq.
1858	Collinson, Henry, Esq. 8, <i>Delamere-street, Paddington, W.</i>
1855	Collinson, Captain Richard, R.N., C.B. <i>Haven-lodge, Ealing, W.; and United Service Club, S.W.</i>
1860	Coningham, William, Esq., M.P. <i>Kemp Town, Brighton.</i>
1843	*Cook, James, Esq. 40, <i>Mincing-lane, E.C.; and 47, Portland-place, W.</i>
1859	Cooke, Major A. C., R.E. <i>Topographical Department, 4, New-street, Spring-gardens, S.W.</i>
1860	Cooke, George Wingrove, Esq., Barrister-at-Law. 25, <i>Cheyne-walk, Temple, E.C.</i>
1856	Cooke, John George, Esq. <i>Martin and Co., Lombard-street, E.C.</i>
1860	290 Cooke, Nathaniel, Esq. 5, <i>Ladbroke-terrace, Notting-hill, W.</i>
1852	Cooke, Robt., Esq. 50, <i>Albemarle-st., W.; and 38, Nottingham-pl., New-road, W.</i>
1860	Cooke, William Henry, Esq., Barrister-at-Law. 4, <i>Elm-court, Temple, E.C.</i>
1830	Cooley, William Desborough, Esq. 10, <i>Portman-street, Portman-square, W.</i>
1843	*Cooper, Capt. D. S., 1st Royal Regt. <i>Army and Navy Club, S.W.</i>
1856	Cooper, Lt.-Col. Edward, Grenadier Guards. 36, <i>Hertford-street, W.</i>
1860	Cooper, Capt. Joshua H. <i>7th Fusiliers, Dépôt, Chatham.</i>
1853	Coote, Charles Chidley, Esq. 64, <i>Albany; and Mount-Coote, Limerick, Ireland.</i>
1857	Coote, Captain Robert, R.N. <i>H.M.S. 'Victory,' Portsmouth.</i>
1853	Copley, Sir Joseph William, Bart. <i>Sprotborough, Doncaster.</i>
1839	300 *Corrance, Frederick, Esq. <i>Parkham-hall, Wickham Market, Suffolk.</i>
1856	Costerton, John C., Esq. <i>Cunton.</i>
1853	*Cosway, William Halliday, Esq. <i>Oxford and Cambridge Club, S.W.</i>
1857	*Cowell, Major J. C., R.E. <i>Buckingham-palace, S.W.</i>
1854	Cowley, Norman, Esq. 4, <i>Montagu-place, Montagu-square, W.</i>
1859	Cracroft, Major Henry. <i>Upton Villas, Haven-green, Ealing, W.</i>
1853	*Cracroft, Captain Peter, R.N. <i>H.M.S. 'Niger,' Australia.</i>
1858	Cranbourne, James, Viscount. 20, <i>Arlington-street, S.W.</i>
1853	Craufurd, Captain Frederic A. B., R.N. <i>Senior United Service Club, S.W.</i>
1857	Craufurd, Major-General James R. Cabe, Grenadier Guards. <i>Travellers' Club, S.W.; and Sunning-hill, Chertsey.</i>
1857	310 CRAWFORD, James, Esq. <i>Brussa, Turkey; and Strathleven, Dumbartonshire, N.B.</i>
1848	*Crawford, Robert Wigram, Esq., M.P. 71, <i>Old Broad-street, E.C.</i>
1830	Crawford, John, Esq., F.R.S. <i>Athenæum Club, S.W.; and 21, Wilton-st., S.W.</i>
1854	*Creswell, Captain S. Gurney, R.N. <i>Lynn, Norfolk.</i>
1859	Creyke, Commander R. Boynton, R.N. <i>Oban, N.B.</i>
1856	Croker, T. F. Dillon, Esq. 19, <i>Pelham-place, Brompton, S.W.</i>
1860	Crosse, the Rev. Thomas, D.C.L. <i>Hastings.</i>
1852	Crowdy, James, Esq. 17, <i>Serjeants'-inn, E.C.</i>
1839	*Cubitt, Sir William, F.R.S., C.E. 6, <i>Great George-street, Westminster, S.W.; and Clapham-common, Surrey, S.</i>
1844	*Cubitt, Mr. Alderman William, M.P. <i>Gray's-inn-road, W.C.; and 21, Alchurch-lane, E.C.</i>

Year of  
Election

- 1859 320 Cull, Richard, Esq., F.S.A. 13, *Tavistock-street, Bedford-square, W.C.*
- 1857 Cumming, William F., Esq., M.D. *Athenæum Club, S.W.; and Athol-crescent, Edinburgh.*
- 1847 \*Cunard, Edward, Esq. *New York.*
- 1846 Cunard, Sir Samuel, Bart. *Howchin's Hotel, St. James's-street, S.W.*
- 1860 Cunliffe, Roger, Esq. 24, *Lombard-street, E.C.; and 10, Queen's-gardens, S. Kensington, W.*
- 1859 Cunningham, H. D. P., Esq., R.N. *Bury, near Gosport, Hants.*
- 1853 Cunningham, John Wm., Esq., Sec. King's College. *Somerset-house, W.C.; and Harrow.*
- 1843 \*Cursetjee, Manockjee, Esq., F.R.S.N.A. *Vilhi-Byculla, Bombay.*
- 1839 \*Curtis, Timothy, Esq.
- 1857 Dalton, D. Foster Grant, Esq. *Parkstone, near Poole; and Shanks House, near Somerset.*
- 1859 330 Dalyell, Robt. Alex. Osborn, Esq. *H.M.'s Consul-General, Erzerum; and Royal Hospital, Greenwich, S.E.*
- 1851 \*Daniell, Wm. Freeman, Esq., M.D., F.L.S. 17, *Charles-st., St. James's-sq., S.W.*
- 1838 \*Darwin, Charles, Esq., M.A., F.R.S. *Athenæum Club, S.W.; and Down, near Bromley, Kent.*
- 1860 Dasent, John Bury, Esq. 22, *Warwick-road, Maida-hill, W.*
- 1858 Davies, William, Esq.
- 1858 Davis, Dr. Francis William, Assist.-Surgeon R.N. *Royal Hospital, Greenwich, S.E.; and Lurganboy House, Manor Hamilton, Ireland.*
- 1846 Davis, Sir John Francis, Bart., K.C.B., F.R.S., F.R.S.N.A. *Athenæum Club, S.W.; and Hollycodd, near Bristol, Gloucestershire.*
- 1855 Davis, Rev. Nathaniel. *Tunis.*
- 1840 \*Dawnay, the Hon. Payan. *Beningborough-hall, Yorkshire.*
- 1830 \*Dawson, Lieut.-Col. R. K., R.E. *Copyhold Enclosure and Tithe Commission, 3, St. James's-square, S.W.*
- 1859 340 De Blaquiere, John, Lord. 16, *Norfolk-street, Park-lane, W.*
- 1852 De Boinville, Chev. Alexander, K.L.H. 6, *Russell-terrace, Holland-road, Brixton, S.*
- 1858 De Bourgho, T. J., Esq. 72, *Buccleuch-street, Edinburgh.*
- 1856 De Crespigny, Lieut. C. A. C., R.N. 8, *Connaught-place, Hyde-park, W.; and Borneo.*
- 1856 De Gex, William Francis, Esq. 8, *Serle-street, Lincoln's-inn, W.C.*
- 1853 De Grey and Ripon, George Frederick Samuel, Earl. 1, *Carlton-gardens, S.W.; and Studley Royal, Ripon.*
- 1859 De la Motte, Lt.-General Peter, C.B. 15, *Craven-hill-gardens, Bayswater, W.*
- 1854 De la Rue, William Frederick, Esq. 110, *Bunhill-row, Chiswell-street, E.C.*
- 1860 Denison, Alfred, Esq.
- 1834 \*Denison, His Excellency Sir William Thomas, Lieut.-Col. R.E., F.R.S. *Governor-General of Australia, Sydney.*
- 1836 350 Denman, Capt. the Hon. Jos., R.N. 17, *Eaton-terrace, S.W.; and H.M. Yacht.*

Year of  
Election.

- 1833 \*Derby, Edward Geoffrey, Earl of, P.C., F.L.S. 23, *St. James's-square, S.W.; and Knowsley-park, Prescott, Lancashire.*
- 1837 De Ros, Rear-Admiral the Hon. J. F. Frederick, F.R.S. 122, *Piccadilly, W.*
- 1854 \*Devaux, Alexander, Esq. 2, *Avenue-road, Regent's-park, N.W.*
- 1837 \*Devonshire, William Cavendish, Duke of, LL.D., M.A., F.R.S. *Devonshire House, Piccadilly, W.; and Hardwicke Hall, Derbyshire.*
- 1833 Dickenson, John, Esq., F.R.S., F.S.A. 39, *Upper Brook-street, W.; and Abbott's-hill, Hemel-Hempstead.*
- 1852 \*Dickenson, John, Esq., jun. *Clarence Chambers, 12, Haymarket, S.W.; and Abbott's-hill, Hemel-Hempstead.*
- 1854 Dickenson, Sebastian Stewart, Esq., Barrister-at-Law. *Brown's-hill, Stroud, Gloucestershire.*
- 1844 Dickenson, Major-Gen. Thomas, Bom. Eng., F.R.A.S. *Hurstpierpoint, Sussex.*
- 1860 Dickinson, Rev. C. S. Allen, B.A. 66, *Hamilton-ter., St. John's Wood, N.W.*
- 1830 360 \*Dickinson, Francis Henry, Esq., F.S.A. 8, *Upper Harley-street, W.; and King-weston-park, Somerset.*
- 1860 Dickinson, Jas. Austen, Esq. 56, *Upper Bagot-street, Dublin.*
- 1859 Dickson, A. Benson, Esq. 19, *Old-buildings, Lincoln's-inn, W.C.*
- 1858 Dickson, Charles Hammer, Esq. *H.M. Consul, Sukum Kalé, Black Sea.*
- 1843 Dickson, Peter, Esq. 28, *Upper Brook-street, W.*
- 1860 Dietz, Bernard, Esq., of Algoa Bay. 3, *Dorset-square, W.*
- 1859 Digby, G. Wingfield, Esq. 35, *Brook-street, Grosvenor-square, W.; and Sherborne Castle, Dorset.*
- 1860 Digby, Lt.-Colonel John Almerus. 6, *Charles-street, Berkeley-square, W.*
- 1836 \*Dilke, Charles Wentworth, Esq. 76, *Sloane-street, S.W.*
- 1845 \*Dilke, Charles Wentworth, Esq., jun. 76, *Sloane-street, S.W.*
- 1859 370 \*Dilke, Charles Wentworth. 76, *Sloane-street, S.W.*
- 1856 Dillon, the Hon. Arthur. 17, *Clarges-street, W.*
- 1840 \*Divett, Edward, Esq., M.P. *Bystock, near Exmouth, Devon.*
- 1854 Dixon, W. Hepworth, Esq., F.S.A. *Essex Villa, Queen's-rd., St. John's wood, N.W.*
- 1857 Dobie, John, Esq., R.N. *Junior United Service Club, S.W.; and Club Chambers, S.W.*
- 1857 Dobie, Robert, Esq., M.D., R.N. 7, *Houghton-place, Amptill-sq., Hampstead-road, N.W.*
- 1841 \*Dodd, George, Esq., F.S.A. 9, *Grosvenor-place, S.W.*
- 1854 Dodson, John George, Esq., M.P. 6, *Seamore-place, Mayfair, W.*
- 1854 \*Dollond, George, Esq. *St. Paul's Churchyard, E.C.*
- 1854 Domville, William T., Esq., R.N., M.D. *Army and Navy Club, S.W.*
- 1836 380 Donaldson, Rev. J. W., D.D., F.R.A.S. *Athenæum Club, S.W.*
- 1853 Donaldson, Sir Stuart. 22, *Rutland-gate, S.W.; and Sydney, Australia.*
- 1854 Donkin, Henry, Esq.
- 1858 Donne, John, Esq. 2, *Powis-place, Bloomsbury, W.C.*
- 1850 Dover, John William, Esq. 124, *Fenchurch-street, E.C.*
- 1854 Dower, John, Esq. 168, *Pentonville-road, N.*
- 1853 Doyle, Sir Francis Hastings C., Bart. *Custom House, E.C.*



Year of  
Election.

- 1845 \*Drash, Solomon Moses, Esq., F.R.A.S. *At Mr. Morrice's, High-street, Watford, Herts.*
- 1846 Drummond, Lieut.-General John. *The Boyce, Dymock, Gloucestershire.*
- 1846 Drury, Capt. Byron, R.N. *Grove-road, Southsea.*
- 1851 390 \*Dr. Wane, Major Francis, R.E. 64, *Lowndes-square, S. W.*
- 1851 \*Ducie, Henry John, Earl, F.R.S. 30, *Princes-gate, S. W.*
- 1859 Duckett, Clark A., Esq., Surgeon R.N. *H.M.S. 'Geyser,' Devonport.*
- 1859 Duckworth, Henry, Esq. 2, *Gambier-terrace, Liverpool.*
- 1860 \*Duff, Mountstuart Elphinstone Grant, Esq., M.P. *Eden, near Banff, Scotland.*
- 1857 Dufferin, Frederick Temple, Lord. *Dufferin Lodge, Highgate, N.; and Clandeboy-house, Belfast.*
- 1840 \*Dundas, Right Hon. Sir David, Q.C. 13, *King's-Bench-walk, Temple, E.C.; and Ochertyre, Co. Perth.*
- 1830 \*Dundas, Vice-Admiral the Hon. Sir Richard Saunders, K.C.B. 13, *New-street, Spring-gardens, S. W.*
- 1860 Dunell, Henry James, Esq. 4, *Upper Hyde-park-gardens, W.*
- 1850 Dunlop, A. Graham, Esq. *Attaché to H.M.'s Legation, Clary Palace, Vienna; and Wyndham Club, S. W.*
- 1859 400 Dunlop, R. H. Wallace, Esq., Indian Civil Service. *East India Club, St. James's-street, S. W.*
- 1837 \*Dunraven, Edwin Richard, Earl of, F.R.S. *Adare-manor, Limerick; and Dunraven-castle, Glamorganshire.*
- 1856 Duprat, Chevalier Alfredo. *H.M.F. Arbitrator, Cape Town, Cape of Good Hope.*
- 1852 D'Urban, Colonel W. J. *Deputy Quartermaster-General, Canada; and Junior U. S. Club, S. W.*
- 1858 Eardley, Sir Culling E., Bart. *Belvidere, Erith.*
- 1857 Eardley, Rev. E. G. Culling. *Teston-rectory, Maidstone.*
- 1854 Eardley-Wilmot, Capt. A. P., R.N., C.B. *H.M.S. 'Nile,' Queenstown.*
- 1856 Eardley-Wilmot, Col. F., M.R.A. *Montreal, Canada.*
- 1857 Eastwick, Captain W. J. 12, *Leinster-terrace, Hyde-park, W.*
- 1858 Edge, Rev. W. J., M.A. *Benenden Vicarage, near Staplehurst, Kent.*
- 1860 410 Egerton, Colonel the Hon. Arthur. *Bridgewater-house, S. W.*
- 1857 Egerton, Commander Charles Randell, R.N. 7, *Rutland-gate, S. W.*
- 1853 Egerton, Captain the Hon. Francis, R.N. *Bridgewater-house, S. W.; and H.M.S. 'Royal Albert.'*
- 1860 Elderton, Edward M., Esq. 40, *St. George's-road, Pinlipo, S. W.*
- 1859 Elgin and Kincaidine, James Bruce, the Earl of, G.C.B. *Athenæum Club, S. W.; and Broom Hall, Dunfermline.*
- 1845 Ellenborough, Edward, Earl of, G.C.B. 12, *Upper Belgrave-street, S. W.; and Southam-house, near Cheltenham.*
- 1855 Ellesmere, George Granville Francis, Earl of, &c. &c. *Bridgewater-house, Cleveland-square, S. W.; and Worsley-hall, Lancashire.*
- 1830 \*Elliott, Rev. Charles Boileau, M.A., F.R.S. *Tuttingstone, Suffolk.*

Year of Election	
1855	†Elliott, Christopher, Esq., M.D. <i>Colombo, Ceylon.</i>
1858	Elphinstone, Captain Howard, R.E. <i>Buckingham Palace, S.W.</i>
1857	420 Elton, Sir Arthur H., Bart. <i>Athenæum Club, S.W.; and Clevedon Court, Somersetshire.</i>
1830	Enderby, Charles, Esq., F.R.S., F.L.S. 13, <i>Great St. Helen's, E.C.</i>
1860	Enfield, Edward, Esq., F.S.A. 19, <i>Chester-terrace, Regent's-park, N.W.</i>
1856	Entwisle, John, Esq. 1, <i>Russell-square, W.C.</i>
1852	Ersline, Rear-Admiral John Elphinstone, C.B. <i>H.M.S. 'Edgar,' 1 L, Albany, W.; and Cardross, Stirling, N. B.</i>
1857	*Esmeade, G. M. M., Esq. 29, <i>Park-street, Grosvenor-square, W.</i>
1850	Espinasse, Capt. J. W., 12th Regt. <i>Cox and Co., Craig's-court, S.W.</i>
1851	Evans, Rev. Charles. <i>Rugby.</i>
1857	Evans, Frederic J., Esq., R.N., F.R.A.S. 4, <i>Wellington-terrace, Charlton, Blackheath, S.E.</i>
1830	*Evans, Rear-Admiral George. 1, <i>New-street, Spring-gardens, S.W.; and Englefield-green, Chertsey.</i>
1857	430 Evans, Thos. Wm., Esq., M.P. 7, <i>Stratford-place, W.; and Allestree Wall, Derby.</i>
1830	*Evans, W. Esq.
1851	*Evelyn, William J., Esq., F.S.A. <i>Wotton-house, near Dorking.</i>
1845	*Everest, Col. Geo., Bengal Art., F.R.S., &c. 10, <i>Westbourne-st., Hyde-park, W.</i>
1830	*Everett, James, Esq.
1859	Ewart, William, Esq., M.P. 6, <i>Cambridge-square, W.</i>
1839	Ewer, Walter, Esq., F.R.S., F.L.S. 8, <i>Portland-place, W.</i>
1856	Ewing, J. D. Crum, Esq. 21, <i>Birchin-lane, E.C.</i>
1857	Eyre, Edward J., Esq., Lieut.-Governor of Antigua.
1856	†Eyre, Col. Vincent, C.B. <i>Athenæum Club, S.W.; and India.</i>
1855	440 Fagan, Lieut.-Col. C. G., Bengal Army. <i>Gresham-house, Old Broad-street, E.C.</i>
1857	Fairholme, Lieut. Chas., R.N. <i>H.M.S. 'Megara,' and York-ter., Leamington.</i>
1856	Fairholme, George Knight, Esq. <i>Union Club, S.W.; and Ravenswood, Melrose, N.B.</i>
1838	Falconer, Thomas, Esq. <i>Usk, Monmouthshire.</i>
1857	Falkland, Lucius Bentinck, Viscount. <i>Skutterselfe, Yorkshire.</i>
1855	*Fanshawe, Capt. E. G., R.N. 27, <i>Rutland-gate, Hyde-park, S.W.</i>
1854	Farmer, William Francis Gamul, Esq. <i>Nonsuch-park, Surrey.</i>
1857	Farrer, Thomas H., Esq. <i>Board of Trade, S.W.; and 21, Chester-terrace, Regent's-park, N.W.</i>
1853	*Fayrer, Joseph, Esq., M.D. 15, <i>Surrey-street, Strand, W.C.</i>
1858	Fazakerley, J. N., Esq. 17, <i>Montagu-street, Portman-square, W.</i>
1838	450 *Fellows, Sir Charles. 4, <i>Montagu-place, Russell-square, W.C.; Cowes, Isle of Wight; and Beeston, Nottinghamshire.</i>
1856	Ferguson, Rev. Robert, LL.D., F.S.A. <i>St. Alban's Villa, Ryde, Isle of Wight.</i>
1856	Ferguson, William, Esq. <i>Gresham-house, Old-Broad-street, E.C.; and 9, Well-walk, Hampstead, N.W.</i>

Year of  
Election.

- 1840 \*Fergusson, James, Esq., F.R.A.S. 20, *Langham-place, W.*
- 1830 Findlay, Alexander, Esq. *Hayes, Kent, S.E.*
- 1844 Findlay, Alex. George, Esq. 53, *Fleet-street, E.C.*; and *Hayes, Kent, S.E.*
- 1859 Fisher, Anthony L., Esq., M.D. 14, *York-place, Baker-street, Portman-square, W.*
- 1859 Fisher, Robert, Esq. 46a, *Pall-mall, S.W.*; and *Parthenon Club, S.W.*
- 1830 \*Fitton, Wm. Henry, Esq., M.D., F.R.S., F.L.S. *Athenæum Club, S.W.*; and 4, *Sussex-gardens, Hyde-park, W.*
- 1857 \*Fitzclarence, Lieut. the Hon. George, R.N. 1, *Addison-road, Kensington, W.*
- 1860 460 Fitzmaurice, Lieut. the Hon. Frederick. 6, *Princes-square, W.*
- 1839 Fitz-Roy, George Henry, Esq. 51, *Portland-place, W.*
- 1830 Fitz-Roy, Rear-Admiral Robert, F.R.S. *Board of Trade, S.W.*; *Athenæum Club, S.W.*; and 38, *Onslow-sq., Brompton, S.W.*
- 1857 Fitzwilliam, the Hon. C. W., M.P. 60, *St. James's-street, S.W.*
- 1853 \*Flemyng, Rev. Francis. *Kidmore End, Henley-on-Thames.*
- 1857 Fletcher, Thomas K., Esq. *Union-dock, Limehouse, E.*
- 1860 Forbes, the Hon. Horace Courtenay. 4, *St. Andrew's-place, Regent's-park, N.W.*
- 1847 Forrester, Joseph J., Esq., F.S.A. 24, *Crutched Friars, E.C.*; and *Oporto.*
- 1845 Forster, Rev. Charles, B.D. *Stisted Rectory, Essex.*
- 1839 \*Forster, William Edward, Esq. *Burley, near Otley.*
- 1858 470 Fortescue, Chichester S., Esq., M.P. 45, *St. James's-place, S.W.*
- 1844 \*Fortescue, Hugh, Lord. 17, *Bruton-st., W.*; and *Castle-hill, South Molton, Devon.*
- 1841 \*Fowler, Rear-Admiral Robert M. *Walliscote-house, Pangbourne.*
- 1850 \*Fowler, Robert N., Esq., M.A. 50, *Cornhill, E.C.*; and *Tottenham, N.*
- 1859 Fox, Lieut.-Colonel A. Lane. *Park-hill, Clapham, S.*
- 1830 \*Fox, Lt.-Gen. C. R. *Travellers' Club, S.W.*; and 1, *Addison-rd., Kensington, W.*
- 1860 Fox, Thos., Esq., M.D. *Inspector-General of Hospitals, North Camp, Aldershot.*
- 1860 Frauks, Charles W., Esq. 5, *John-street, Berkeley-square, W.*
- 1854 Fraser, Charles, Esq. 38, *Conduit-street, W.*
- 1830 Fraser, Major-General John, R.E. *Deputy Quartermaster-General, Ceylon.*
- 1860 480 Fraser, Thomas, Esq. *Literary Secretary, Hudson Bay Company, Hudson Bay House, E.C.*
- 1860 Freeman, Daniel Alexander, Esq. *Upper Tooting.*
- 1859 Freeman, H. Stanhope, Esq. *Vice-Consul, Ghadamis*; and 4, *Royal-crescent, Notting-hill, W.*
- 1856 Fremantle, Rt. Hon. Sir Thomas F., Bart. 4, *Upper Eccleston-street, Belgrave-square, S.W.*
- 1852 French, Dr. James, C.B. *Inspector-General of Hospitals, Graham's Hotel, Edinburgh.*
- 1850 Frere, Bartle J. L., Esq. 45, *Bedford-square, W.C.*
- 1839 \*Freie, George, Esq., jun. *Cape of Good Hope*; and 45, *Bedford-square, W.C.*
- 1842 Frere, William Edw., Esq., F.R.A.S. *Bombay*; and 45, *Bedford-square, W.C.*
- 1853 Frith, John Griffith, Esq. 13, *Wimpole-street, W.*; and 11, *Austin Friars, E.C.*
- 1859 Fryer, William, Esq. 10, *Marlborough-hill-gardens, St. John's Wood, N.W.*
- 1855 490 Fuller, John, Esq. 9, *Vere-street, Oxford-street, W.*
- 1860 Fussell, Rev. J. G. Curry. 16, *Endogan-place, S.W.*

Year of Election	
1855	*Gabriel, Edmund, Esq. <i>H.M.'s Arbitrator, St. Paul de Louando; and 1, James-street, Adelphi, W.C.</i>
1845	*Gage, Admiral Sir William Hall, G.C.H., K.C.B. <i>Thurston Cottage, Bury St. Edmund's, Suffolk.</i>
1858	Gaisford, Thomas, Esq. <i>Travellers' Club, S.W.</i>
1855	*Galloway, John James, Esq. 14, <i>Trinity-square, Tower-hill, E.C.</i>
1848	*Galton, Capt. Douglas, R.E. 12, <i>Chester-street, Grosvenor-place, S.W.</i>
1850	*Galton, Francis, Esq., M.A. 42, <i>Rutland-gate, S.W.; and 5, Bertie-terrace, Leamington.</i>
1854	*Gammell, Andrew, Esq. <i>Drumtochty, Kincardineshire, N.B.</i>
1859	Gammie, George, Esq. <i>Shotover House, Wheatley, Oxon.</i>
1833	500 Gascoigne, Capt., <i>Ceylon Rifles. Athenæum Club, S.W.</i>
1859	*Gassiot, John P., Junr., Esq. 6, <i>Sussex-place, Regent's-park, N.W.</i>
1858	Gausson, William, Esq. 12, <i>Montagu-place, Russell-square, W.C.</i>
1838	*Gawler, Colonel George, K.H. <i>United Service Club, S.W.</i>
1859	Gerstenberg, Isidore, Esq. 11, <i>Warnford-court, Throgmorton-street, E.C.</i>
1830	*Gibbes, Charles, Esq. 24, <i>Cavendish-square, W.</i>
1859	*Gibbs, H. Hucks, Esq. <i>St. Dunstan's, Regent's-park, N.W.</i>
1853	Gifford, George, Earl of, M.P. 2, <i>Wilton-street, Grosvenor-place, S.W.</i>
1857	Gilchrist, John, Esq. 48, <i>Porchester-terrace, W.</i>
1855	Gillespie, Alexander, Esq. 38, <i>Gordon-square, W.C.</i>
1857	510 Gillespy, Thomas, Esq. <i>Brabant-court, Philpot-lane, E.C.</i>
1857	Gilmore, Lieut. A. H., R.N. <i>H.M.S. 'Renown,' Channel Squadron.</i>
1852	Gisborne, Lionel, Esq., C.E. 6, <i>Duke-street, Adelphi, W.C.</i>
1836	Gladdish, William, Esq. <i>Bycliffes, Gravesend.</i>
1846	*Gladstone, William, Esq. 57½, <i>Old Broad-street, E.C.</i>
1857	Gleig, Rev. G. R., M.A. <i>Chaplain-General, Chelsea-hospital, S.W.</i>
1854	Glen, Joseph, Esq., M.D., Mem. Geogr. Soc. of Bombay. <i>Oriental Club, W.</i>
1857	Glennie, John S. Stuart, Esq., F.S.A., Barrister-at-law. <i>Reform Club, S.W.; and 6, Stone-buildings, Lincoln's-inn, W.C.</i>
1857	Glover, Lieut. John H., R.N. <i>Army and Navy Club, S.W.</i>
1860	Glyn, Commr. H. Carr, R.N. 1, <i>Eccleston-street, Belgrave-square, S.W.</i>
1858	520 Glyn, Pascoe Charles, Esq. <i>Gresham-house, 62, Old Broad-street, E.C.; and 1, Upper Eccleston-street, Belgrave-square, S.W.</i>
1858	Godley, John Robert, Esq. <i>War Office, S.W.</i>
1857	Goldsmid, Aaron A., Esq. 8, <i>Cavendish-square, W.</i>
1858	Goldsmid, Frederick D., Esq. 50, <i>Harley-street, W.</i>
1860	Gooch, Thomas Longridge, Esq. 101, <i>Inverness-terrace, Bayswater, W.</i>
1856	Gordon, Alexander, Esq., C.E. 3, <i>Middle Scotland-yard, Whitehall, S.W.</i>
1856	*Gordon, Colonel the Hon. Alexander H., C.B. <i>Argyll-house, Regent-street, W.</i>
1860	Gordon, the Honourable Arthur. 7, <i>Argyll-street, W.</i>
1858	Gordon, Capt. Charles C., R.E. <i>Brompton Barracks, Chatham.</i>
1860	Gordon, Rev. Cosmo Reid, M.A., F.S.A. 78, <i>Dorset-street, Hulme, Manchester.</i>
1854	530 Gordon, Harry George, Esq. 1, <i>Clifton-place, Hyde-park-gardens, W.; and Killychassi, Dunkeld, Perthshire.</i>

Year of Election	
1856	Gordon, James Wilkinson, Esq. 10, <i>New Palace Yard, S.W.</i>
1856	Gordon, Rear-Admiral the Honourable John. 13, <i>Queen Anne-street, W.</i>
1853	Gordon, Rear-Admiral Robert. <i>United Service Club, S.W.</i>
1853	Gore, Montagu, Esq. <i>Palace Chambers, 88, St. James's-street, S.W.</i>
1853	Gore, Richard Thomas, Esq. 6, <i>Queen-square, Bath.</i>
1853	Gorman, John, Esq., M.D. <i>Mark-lane, E.C.</i>
1859	Gosling, Fred. Solly, Esq. 1, <i>Gray's-inn-square, W.C.</i>
1835	Gould, Lieut.-Colonel Francis A. <i>Buntingford, Herts.</i>
1846	Gould, John, Esq., F.R.S., F.L.S. 26, <i>Charlotte-street, Bedford-square, W.C.</i>
1830	540*Gowen, James Robert, Esq. 4, <i>Codrington-place, Western-road, Brighton.</i>
1858	Graham, Cyril C., Esq. <i>Cairo.</i>
1833	*Graham, the Right Hon. Sir James R. G., Bart., M.P., F.R.S., &c. 46, <i>Grosvenor-place, S.W.</i> ; and <i>Netherby, near Carlisle.</i>
1857	Grant, Capt. W. C., 2nd Dragoon Guards. <i>Junior U. S. Club, S.W.</i> ; and <i>Brigade Major, Lucknow.</i>
1830	*Gray, John Edw., Esq., PH.D., F.R.S., Z.S. and L.S. <i>British Museum, W.C.</i>
1830	Greene, Thomas, Esq. <i>Whittington-hall, near Burton, Westmoreland.</i>
1857	*Greenfield, W. B., Esq. 2, <i>Porchester-terrace North, W.</i>
1858	*Gregory, Augustus Chas., Esq. <i>Sydney.</i>
1858	Gregory, Charles Hutton, Esq., C.E. 1, <i>Delahay-street, Westminster, S.W.</i>
1860	Gregory, Francis Thomas, Esq. <i>Survey Department, W. Australia.</i> 8, <i>Cecil-street, W.C.</i> ; and <i>Castle-hill, Wycombe.</i>
1858	550*Gregory, Isaac, Esq. <i>Chorlton Hall, Victoria-park, Manchester.</i>
1857	*Grellet, Henry Robert, Esq. 7, <i>Lloyd-street, Lloyd-square, E.C.</i>
1859	Grenfell, Chas. Pascoe, Esq., M.P. 38, <i>Belgrave-square, S.W.</i>
1858	Grenfell, Pascoe St. Leger, Esq. <i>Maesteg-house, Swansea.</i>
1853	Grenfell, Riversdale W., Esq. 27, <i>Upper Thames-street, E.C.</i>
1830	*Greswell, Rev. Richard, M.A., F.R.S. 39, <i>St. Giles, Oxford.</i>
1837	*Grey, Sir George, K.C.B. <i>Governor &amp; Commander-in-Chief, Cape of Good Hope.</i>
1844	*Grey, Ralph Wm., Esq. 47, <i>Belgrave-sq., S.W.</i> ; and <i>Chipchase-castle, Hexham.</i>
1839	Griffith, John, Esq. 16, <i>Finsbury-place South, E.C.</i>
1836	Griffith, Richard Clewin, Esq. 10, <i>Gower-street, Bedford-square, W.C.</i>
1859	560 Grimston, the Hon. and Rev. Francis S. <i>Wakes Colne, Halstead.</i>
1855	Grindrod, R. B., Esq., M.D., LL.D., F.L.S., &c. <i>Townsend-house, Malvern.</i>
1858	Grote, George, Esq. 12, <i>Savile-row, W.</i>
1857	Gruneisen, Charles Lewis, Esq. 16, <i>Surrey-street, Strand, W.C.</i>
1830	*Gurney, Hudson, Esq., F.R.S., F.S.A., F.R.S.N.A. 9, <i>St. James's-square, S.W.</i> ; and <i>Kescick-hall, near Norwich.</i>
1859	*Gurney, John H., Esq., M.P. 24, <i>Kensington Palace Gardens, W.</i>
1857	Gurney, Samuel, Esq., M.P. 25, <i>Princes-gate, Hyde-park, S.W.</i> ; and <i>Carshalton, Surrey.</i>
1853	*Halkett, Rev. Dunbar S. <i>Little Bookham, Surrey.</i>
1853	*Halkett, Lieut. Peter A., R.N. <i>Wyndham Club, S.W.</i>

Year of  
Election.

- 1853 Hall, Captain William Hutcheson, R.N., C.B., F.R.S. *United Service Club, S. W. ; and Phillimore-gardens, Kensington, W.*
- 1856 570 Halloran, Alfred L., Esq., Master R.N. *Tamerton Folliot, near Plymouth, Devon.*
- 1858 Halloran, Arthur B., Esq. *Principal of the South Devon Collegiate School, Heavitree, Exeter.*
- 1857 Hamilton, Edward, Esq., M.D. 22, *Grafton-street, W.*
- 1857 Hamilton, Edward Terrick, Esq. 32, *Upper Brook-street, W.*
- 1830 \*Hamilton, Capt. Henry G., R.N. 71, *Eccleston-square, S. W.*
- 1830 Hamilton, Terrick, Esq. 121, *Park-street, Grosvenor-square, W.*
- 1846 Hamilton, Rear-Admiral W. A. Baillie. *Macartney-house, Blackheath, S.E.*
- 1837 Hamilton, Wm. John, Esq., F.R.S. 23, *Chesham-place, S. W.*
- 1830 Hammersley, Charles, Esq. 25, *Park-crescent, Portland-place, W.*
- 1858 Hammond, Rev. J. W., B.D., Fellow of St. John's College, Oxford. *Reform Club, S. W.*
- 1853 580 \*Hand, Captain George S., R.N. *United Service Club, S. W. ; and H.M.S. 'Sampson.'*
- 1857 Hankey, Thomson, Esq., M.P. 45, *Portland-place, W.*
- 1837 \*Hanmer, Sir J., Bart., M.P., F.R.S. *Hammer-hall and Bettisfield-park, Flintshire.*
- 1859 \*Hansard, Henry, Esq. 14, *Park-square, Regent's-park, N. W.*
- 1840 \*Harcourt, Egerton, Esq. *Athenæum Club, S. W. ; and 5, Curiton-gardens, S. W.*
- 1853 Harcourt, Rear-Admiral Octavius Vernon. 29, *Devonshire-place, Portland-place, W. ; and Swinton-park, Bedale, Yorkshire.*
- 1834 \*Harding, Major-Gen. George Judd, C.B. *Lieut.-Governor of Guernsey.*
- 1854 Hardy, Peter, Esq., F.R.S. 36, *Brunswick-square, W. C.*
- 1855 Harris, the Hon. and Rev. C. A. *Rounham's Parsonage, Southampton.*
- 1853 Harris, Capt. the Hon. E. A. J., R.N. *H. B. M.'s Minister Plenipotentiary, Berne.*
- 1852 590 Harris, George Frederick, Esq., M.A. *Harrow-park, Middlesex, N. W.*
- 1859 Harris, Capt. Henry. 15, *Gloucester-terrace, Hyde-park, W.*
- 1859 Harrison, C. H. Rogers, Esq. 13, *Lansdowne-road, Clapham-road, S.*
- 1856 Harrison, George Marsh, Esq. 10, *Lansdowne-road Villas, Notting-hill, W.*
- 1838 Harrowby, Dudley, Earl of. *Sandon-ho., Lichfield ; and Norton, Gloucestershire.*
- 1854 \*Hartland, Frederick D., Esq., F.S.A., &c. *The Oaklands, near Cheltenham.*
- 1846 Harvey, W. S., Esq., R.N. *H.M.S. 'Hannibal,' Mediterranean ; and 40, Charing-cross, S. W.*
- 1859 Harwood, H. Harwood, Esq. 29, *Cleveland-square, Hyde-park, W.*
- 1858 Hawker, Edward J., Esq. 37, *Cadogan-place, W.*
- 1834 Hawkins, Bisset, Esq., M.D., F.R.S. 29, *Upper Harley-street, W. ; and Lewell Lodge, Dorchester.*
- 1857 600 Hawkins, Commander Frank K., R.N. *Army and Navy Club, S. W.*
- 1840 \*Hawkins, John, Esq.
- 1858 \*Hawkins, Lieut.-Col. J. Summerfield, R.E. *N. W. American Boundary Commission.*
- 1860 Haworth, Frederick, Esq. 9, *Eccleston-street, S. W.*
- 1830 Hawtrey, Rev. Edward Craven, D.D., F.S.A. *Eton College.*
- 1852 \*Hay, Capt. J. C. Dalrymple, R.N. 24, *Prince's-gate, Hyde-park South, S. W.*
- 1830 \*Hay, Robert Wm, Esq., F.R.S., F.S.A., &c. *Blechynden-terrace, Southampton.*

Year of  
Election.

- 1859 Hay, Major W. E. *Pitfour Castle, Perth.*
- 1853 Hayward, Robert Newton, Esq. *Porchester-villa, Grange-loan, Edinburgh.*
- 1859 Heard, G. G. Gilbert, Esq., F.S.A. 18, *Devonshire-terrace, Hyde-park, W.*
- 1856 610 Heath, J. Benjamin, Esq., F.R.S., F.S.A., Consul for Sardinia. 31, *Old Jewry, E.C.*
- 1859 Hellmann, Christian, Esq. *Club-chambers, Regent-street, S.W.*
- 1859 Hely, Hovendon, Esq. *Australian Club, Sydney.*
- 1856 Henderson, Andrew, Esq.
- 1837 \*Henderson, James, Esq. *Littlewood-park, Forbes, Aberdeenshire.*
- 1853 †Henderson, John, Esq. *Valparaiso.*
- 1852 Henderson, William, Esq. 5, *Stanhope-street, Hyde-park-gardens, W.*
- 1844 \*Heneage, Edward, Esq. 14, *William-street, Lowndes-square, S.W.*
- 1860 †Hennessey, J. B. N., Esq. 1st Asst. *Trij. Survey of India, Mussoorie Hills, N.W. Provinces, India.*
- 1838 \*Henry, Wm. Chas., Esq., M.D., F.R.S. *Huffield, near Ledbury, Herefordshire.*
- 1834 620 Herbert, Jacob, Esq. *Trinity-house, Tower-hill, E.C.*
- 1845 \*Herbert, Right Hon. Sidney, M.P. 49, *Belgrave-sq., S.W.*; and *Wilton-ho., Wilts.*
- 1833 \*Herbert, Vice-Admiral Sir Thomas, K.C.B. 74, *Cadogan-place, S.W.*; and *Torc Cottage, Killarney, Ireland.*
- 1857 Herd, Captain D. J. 2, *Norway-house, Limehouse, E.*
- 1858 Hertslett, Edward, Esq. *Librarian, Foreign Office, S.W.*; and *Belle Vue-house, Richmond, S.W.*
- 1841 Hessey, James Augustus, Esq. 26, *Addison-road, Kensington, W.*
- 1856 Hewitt, James, Esq. *Lecturer in Battersea Training College, S.W.*
- 1858 Hewitt, Capt. J. Napier. *Tyr Mab Ellis, Pont-y-Pridd, Glamorgan.*
- 1840 \*Heywood, James, Esq., F.R.S. *Athenæum Club, S.W.*; and 26, *Kensington Palace Gardens, W.*
- 1853 Hickey, Edwin A., Esq. 21, *Leinster-gardens, Hyde-park, W.*
- 1856 630 Hill, Arthur Bowdler, Esq. *South-road, Clapham-park, Surrey, S.*
- 1857 Hill, Rev. Charles C. *South-road, Clapham-park, Surrey, S.*
- 1854 Hill, Lieut.-Colonel Stephen J. *Army and Navy Club, S.W.*; and *Governor and Commander-in-Chief, Sierra Leone.*
- 1858 Hinchliff, T. Woodbine, Esq., Barrister-at-Law. 3, *Stone-bdys., Lincoln's-inn, W.C.*
- 1860 Hind, Professor Henry Youle, M.A. *Toronto, Canada West.*
- 1846 \*Hindmarsh, Frederick, Esq. 17, *Bucklersbury, E.C.*
- 1846 Hobbs, J. S., Esq. 157, *Leadenhall-street, E.C.*
- 1855 Hobbs, Wm. Geo. Ed., Esq. *Master of Grammar School, Waresile, near Ware.*
- 1830 \*Hobhouse, Henry William, Esq. 24, *Cadogan-place, S.W.*
- 1834 \*Hodgkin, Thomas, Esq., M.D. 35, *Bedford-square, W.C.*
- 1856 640 \*Hodgson, Arthur, Esq., Superintendent of the Australian Agricultural Company.
- 1857 Hodgson, Kirkman Daniel, Esq., M.P. 8, *St. Helen's-place, Bishopsgate, E.C.*
- 1856 Hogg, James, Esq., Jun. 18, *St. Andrew's-square, Edinburgh.*
- 1830 Hogg, John, Esq., M.A., F.R.S., F.L.S., Foreign Sec. R. Soc. of Literature. 8, *Sergeants' Inn, Temple, E.C.*; and *Norton-house, Stockton-upon-Tees.*
- 1839 \*Holford, Robert S., Esq., M.P. *Dorchester-house, Park-lane, W.*
- 1830 Holland, Sir Henry, Bart., M.D., F.R.S. 25, *Lower Brook-street, W.*

Year of  
Election.

- 1835 \*Holmes, James, Esq. 4, *New Ormond-street, Queen-square, W.C.*
- 1839 \*Holroyd, Arthur Todd, Esq., M.D., F.L.S. *Athenæum Club, S.W.*
- 1857 Holroyd, Henry, Esq., Barrister-at-Law. 2, *Elm-court, Temple, E.C.*
- 1857 Homfray, Frederick Samuel, Esq., C.E. 6, *Storey's-gate, S.W.*
- 1857 650 Homfray, William Henry, Esq. 6, *Storey's-gate, S.W.*
- 1859 \*Hood, William Charles, Esq., M.D. *Bethlehem Hospital, S.*
- 1830 \*Hooker, Sir Wm. J., K.H., PH. D., LL.D., F.R.S., F.S.A., &c. *West-park, Kew, W.*
- 1846 \*Hope, Alex. James Beresford, Esq. *Arklow House, Connaught-place, Hyde-park, W.; and Bedjebury-park, Hurst-green, Kent.*
- 1857 Hoper, Richard, Esq. 53, *Margaret-street, Cavendish-square, W.*
- 1857 †Hose, Rev. Henry J., M.A. *Warden of St. Paul's College University, Sydney.*
- 1853 Hoskins, George Alex., Esq. *Athenæum Club, S.W.*
- 1859 \*Hoskyns, Chandos Wren, Esq. *Wraichall Abbey, Warwickshire.*
- 1858 Hoste, Capt. Sir William, Bart., R.N. *United Service Club, S.W.*
- 1856 Hovell, William Hilton, Esq. *Goulburn, New South Wales.*
- 1853 660 Howard, Sir Ralph, Bart. 17, *Belgrave-sq., S.W.; and Bushy-park, Wicklow.*
- 1857 Howard, Samuel Lloyd, Esq. *Goldings, Loughton, Essex.*
- 1842 \*Hubbard, J. Gellibrand, Esq. 24, *Prince's-gate, Hyde-park South, S.W.*
- 1857 Hughes, Capt. Sir Frederic. *Ely-house, Wexford.*
- 1838 Hughes, Wilham, Esq. 48, *Thornhill-square, Islington, N.*
- 1838 \*Hume, Edmund Kent, Esq.
- 1860 Hume, Hamilton, Esq. *Cooma Yass, New South Wales.*
- 1857 Hunt, Zacharias Daniel, Esq. *Aylesbury.*
- 1860 Huskisson, Wm. H. Tilghman, Esq. *Eartham, near Chichester.*
- 1858 Hutchison, Consul Thomas J. *The Rosery, Broadway, Wexford.*
- 1851 670 Hyde, James Bartlet, Esq. *Conservative Club, S.W.*
- 1860 \*Hyde, Captain Samuel. 8, *Billiter-square, E.C.*
- 1854 Ifill, Benjamin, Esq. 19, *Campden-hill-road, W.*
- 1852 Illingworth, Richard Stonhewer, Esq. 9, *Norfolk-crescent, Hyde-park, W.*
- 1850 \*Imrny, James, Esq., jun. 102, *Minories, E.; and Manor-park, Streatham, S.*
- 1860 Ingilby, the Rev. Henry John. *Ripley Castle, Ripley, Yorkshire.*
- 1851 Inglefield, Captain Edward A., R.N., F.R.S. *United Service Club, S.W.*
- 1860 Ingram, Herbert, Esq., M.P. 11, *Montagu-street, Portman-square, W.*
- 1846 Ingram, Hughes Francis, Esq. *University Club, S.W.*
- 1860 \*Inskip, G. H., Esq., Master R.N. 23, *Anne-street, Sunderland.*
- 1852 680 \*Inskip, Rev. Robert Mills. 8, *Down's-place, Plymouth.*
- 1840 \*Irby, Frederick W., Esq. *Athenæum Club, S.W.*
- 1853 Irving, Thomas, Esq. 14, *Belsize-road, St. John's-wood, N.W.*
- 1850 Jackson, William, Esq. 47, *Russell-square, W.C.*
- 1855 Jackson, William, Esq., M.P. *Fenton's Hotel, S.W.*



Year of  
Election.

- 1857 James, Colonel Sir Henry, B.E., F.R.S. *Superintendent Ordnance Survey, Southampton.*
- 1859 \*Janson, T. Corbyn, Esq. *Stamford-hill, N.*
- 1857 Jefferson, Richard, Esq. *Army and Navy Club, S.W.*
- 1854 Jellicoe, Charles, Esq. 23, *Chester-terrace, N.W.*
- 1859 Jencken, H. Diedrich, Esq. 10, *St. Swithin's-lane, E.C.*; and 2, *York-terrace, Upper Sydenham, S.E.*
- 1854 690 Jenkins, Capt. Griffith, I.N., C.B. *India; and East India Club, St. James's-square, S.W.*
- 1837 \*Jenkins, R. Castle, Esq. *Beachley, near Chepstow.*
- 1851 Jennings, John, Esq., F.S.S. 7, *Gough-square, Fleet-street, E.C.*
- 1854 \*Jennings, William, Esq., M.A. 13, *Victoria-street, Westminster, S.W.*
- 1858 Jermyn, the Venerable Archdeacon Hugh Willoughby. *Nettlecome Rectory, near Taunton, Somerset.*
- 1860 Jermyn, Rowland Formby, Esq. *War Office, S.W.*
- 1858 Johnson, Capt. Clement. *Carlton Club, S.W.*; and 1, *Whitehall, S.W.*
- 1857 Johnson, Edmund Chas., Esq. 20, *Arlington-street, S.W.*; and 6, *Savile-row, W.*
- 1859 \*Johnson, Henry, Esq. 39, *Crutched Friars, E.C.*
- 1854 Johnson, John Hugh, Esq. 6, *Charing Cross, S.W.*
- 1843 700 Johnston, Alex. Keith, Esq., F.R.S.E., Hon. Mem. Berl. Geog. Soc., etc. *March-hall-park; and 4, St. Andrew-square, Edinburgh.*
- 1856 Johnston, A. R., Esq. *Athenæum Club, S.W.*; and 25, *Mount-street, W.*
- 1857 Johnston, J. Brookes, Esq. *Newington-terrace, Kennington-park, S.*
- 1858 Johnston, Capt. J. Gilbert. 8, *York-terrace, Regent's-park, N.W.*
- 1853 Johnstone, Sir John V. B., Bart., M.P., D.C.L. 27, *Grosvenor-square, W.*; and *Huckness-hall, near Scarborough.*
- 1858 Jones, Capt. Edward Monckton, 20th Regt. *Brigade Office, Dover.*
- 1851 Jones, Major-General Sir Harry D., R.E., K.C.B. *R. M. College, Farnborough Station, Hants.*
- 1857 Jones, Capt. Jenkin, Bombay Engineers. 1, *Lennard-place, Circus-road, St. John's-wood, N.W.*; and *India.*
- 1840 \*Kalergi, John, Esq. 23, *Montagu-square, W.*
- 1855 †Kane, Major Fred. A. C., 15th Regt. Bombay N.I. *Junior U. Service Club, S.W.*
- 1858 710 Kay, David, Esq. 6, *North Bridge, Edinburgh.*
- 1858 Keane, Edward Arthur, Lord. 17, *St. George's-place, Hyde-park-corner, S.W.*; and *Stetchworth-park, Newmarket.*
- 1857 Keating, Sir Henry Siuger, Q.C., M.P., one of the Judges of the Court of Common Pleas. 11, *Prince's-gardens, S.W.*
- 1857 Keene, Rev. C. E. Ruck. *Swynscombe-park, Henley-upon-Thames.*
- 1845 \*Kellett, Commodore Henry, R.N., C.B. *Clonmell, Ireland.*
- 1860 Kemball, Major Arnold Burrowes, C.B., Indian Army. *H.M.'s Consul-General, Bagdad; and 6, Chester-place, Hyde-park, W.*
- 1860 Kendall, Henry, Esq., Consul, Peru. 11, *New Broad-street, E.C.*; and *The Limes, Mortlake.*

Year of  
Election.

- 1859 Kennard, Coleridge J., Esq. 26, *Chester-terrace, Regent's-park, N.W.*
- 1854 Kennedy, Rev. John, M.A. 4, *Stepney-green, E.*
- 1851 † Kent, John, Esq. *Shufston, Moreton Bay, Australia.*
- 1859 720 Key, Capt. Astley Cooper, R.N., C.B. *United Service Club, S.W.*
- 1857 Keysell, Francis P., Esq. *Sycamore Villa, 35, Carlton-hill, St. John's-wood, N.W.*
- 1846 King, Lieut.-Colonel Edward R., 36th Regt. *Junior United Service Club, S.W.*
- 1858 King, Rev. Samuel W., A.M. *Saxlingham Rectory, Norfolk.*
- 1857 Kinkel, Gottfried, Esq., PH. D. 6, *Eastbourne-terrace, W.*
- 1857 \*Kinnaird, Hon. Arthur F., M.P. 2, *Pal-mall East, S.W.*
- 1860 Kinns, Samuel, Esq., Phil. Dr., F.R.A.S. *Highbury New Park College, N.*
- 1858 † Kirk, John, Esq., M.D. *Livingstone Expedition.*
- 1835 \*Kjaer, Thomas Andreas, Esq., Harbour-master. *St. Thomas. West Indies.*
- 1859 Labrow, Valentine, Esq. 22, *Chancery-lane, W.C.*
- 1860 730 Labuan, Right Rev. F. T. MacDougall, Bishop of. 4, *Queen's-terr., Hyde-park, W.*
- 1849 \*Laffan, Capt. Robert Michael, R.E. *Army and Navy Club, S.W.; and Otham Lodge, Kent.*
- 1833 \*Laird, M'Gregor, Esq. 3, *Mincing-lane, E.C.; and 2, Clarendon-terr., Brighton.*
- 1860 Lake, William, Esq., Bengal Civil Service. 93, *Inverness-terr., Hyde-park, W.*
- 1859 Lamb, Lieut. Henry, I.N. *East India House, Leadenhall-street, E.C.*
- 1838 \*Lance, John Henry, Esq., F.L.S. *The Holmwood, Dorking.*
- 1859 \*Lange, Daniel A., Esq. 21, *Regent-street, S.W.*
- 1856 Langler, J. R., Esq., Lecturer, Wesleyan Normal Institution. *Westminster, S.W.*
- 1856 Lansdowne, Henry, Marquis of, K.G., D.C.L., F.R.S. *Lansdowne-house, Berkeley-square, W.; Richmond-hill, Surrey, S.W.; and Boxwood-park, Wilts.*
- 1833 \*Larcom, Lieut.-Colonel Sir Thomas Aiskew, R.E., F.R.S. *Custom-house, Dublin.*
- 1859 740 Larnach, Donald, Esq. 21, *Kensington Palace Gardens, W.*
- 1852 Latham, Robert Gordon, Esq., M.D., F.R.S., &c. *Greenford-house, Hanwell, Middlesex, W.*
- 1854 Latrobe, Ch. J., Esq. *Athenæum Club, S.W.; and Whitbourne Court, Worcester.*
- 1854 Laurie, Walter, Esq. 2, *Princes-street, Mansion-house, E.C.*
- 1846 \*Law, the Hon. H. Spencer, M.A. 1, *Lowndes-st., S.W.; and Ellington-h., Ramsgate.*
- 1830 Law, William J., Esq. 63, *Upper Seymour-street, W.; 33, Lincoln's-inn-fields, W.C.; and 5, Sussex-square, Brighton.*
- 1851 Lawrence, Edward B., Esq. 20, *King-street, Portman-square, W.*
- 1857 Layard, Austen H., Esq., D.C.L. 130, *Piccadilly, W.*
- 1853 \*Le Breton, Francis, Esq. 21, *Sussex-place, Regent's-park, N.W.*
- 1856 Lee, Charles, Esq. 41, *Grosvenor-place, S.W.*
- 1857 750 Lee, George, Esq. *Shenfield House, Brentwood, Essex.*
- 1830 \*Lee, John, Esq., LL.D., F.R.S., F.S.A., F.R.S.N.A., &c. 5, *College, Doctors'-commons, E.C.; and Hartwell-house, near Aylesbury, Bucks.*
- 1839 Lee, Thomas, Esq. 5, *George-yard, Lombard-street, E.C.; and Great Barr, Staffordshire.*
- 1833 \*Lefevre, Sir John George Shaw, M.A., D.C.L., F.R.S., Vice-Chancellor of the University of London. 8, *Spring-gardens, S.W.*

Year of Election.	
1858	Lefroy, Charles E., Esq. <i>Ewshot-house, Farnham, Surrey.</i>
1853	Lefroy, Colonel John Henry, R.A., F.R.S. <i>Royal Arsenal, Woolwich, S.E.</i>
1845	Leigh, John Studdy, Esq. 7, <i>St. Stephen's-terrace, Westbourne-grove, W.</i>
1836	Lemon, Sir Charles, Bart., F.R.S., &c. <i>Carclew, near Falmouth, Cornwall.</i>
1857	*Lenox, George Wm., Esq. 30, <i>Bedford-square, W.C.</i> ; and <i>Pont-y-Pridd, Glamorganshire.</i>
1855	Leslie, George F., Esq. 45, <i>Rutland-gate, Hyde-park, S.W.</i>
1859	760 Leslie, Patrick, Esq. 45, <i>Rutland-gate, Hyde-park, S.W.</i>
1859	Leslie, Walter D., Esq. 45, <i>Rutland-gate, Hyde-park, S.W.</i>
1840	*Letts, Thomas, Esq. 8, <i>Royal Exchange, E.C.</i>
1857	Leverson, George B. C., Esq. 19, <i>Bloomsbury-square, W.C.</i>
1859	Levinsohn, Louis, Esq. 7, <i>Finsbury-square, E.C.</i>
1859	Lewis, Rev. Evan, B.A. <i>Rothwell, Northamptonshire.</i>
1858	Lewis, Rev. Henry, M.A. <i>St. Paul's Church-buildings, Clapham-common, S.</i>
1852	Leycester, Commander Edmund M., R.N. <i>Messrs. Chard, 3, Clifford's-inn, E.C.</i>
1857	Liardet, Capt. Francis, R.N. <i>Royal Hospital, Greenwich, S.E.</i>
1859	Lichfield, Thomas George, Earl of. <i>Shugborough, Staffordshire.</i>
1860	770 Lindsay, H. Hamilton, Esq. 22, <i>Berkeley-square, W.</i>
1857	Lindsay, Colonel the Hon. J., Gren. Guards, M.P. 20, <i>Portman-square, W.</i>
1855	*Lindsay, Wm. S., Esq., M.P. <i>Manor House, Shepperton, Middlesex.</i>
1858	Lister, John, Esq., M.D. 6, <i>Porchester-terrace, Hyde-park, W.</i>
1857	*Lloyd, George A., Esq. 2, <i>Royal Exchange-buildings, E.C.</i>
1859	Loch, Henry B., Esq. 11, <i>Brook-street, W.</i>
1857	Loch, William Adam, Esq. 8, <i>Great George-street, Westminster, S.W.</i>
1858	Lockhart, William, Esq., F.R.C.S. <i>Park-villas, Granville-park, Blackheath, S.E.</i>
1856	• *Logan, Sir William Edmond, F.R.S. <i>Montreal, Canada.</i>
1855	Login, Sir John Spencer. 5, <i>The Square, Upper Hyde-park-gardens, W.</i>
1860	780 Londesborough, Wm. Henry Forester, Lord. 8, <i>Carlton-house-terrace, S.W.</i>
1830	Long, George, Esq., M.A. 22, <i>Buckingham-street, Brighton.</i>
1839	*Long, Henry L., Esq. <i>Travellers' Club, S.W.</i> ; and <i>Hampton-lodge, Farnham, Surrey.</i>
1857	*Long, W. Beeston, Esq. 4, <i>Great Cumberland-place, W.</i>
1858	Longden, Morrell D., Esq. 4, <i>Ennismore-place, Hyde-park, S.W.</i>
1847	Longman, Thos., Esq. <i>Paternoster-row, E.C.</i> ; and 8, <i>Sussex-square, Hyde-park, W.</i>
1858	Longman, William, Esq. 36, <i>Hyde-park-square, W.</i>
1856	Lovett, Phillips Cosby, Esq. <i>Liscombe-house, Liscombe, near Leighton Buzzard, Bucks.</i>
1858	Lowden, Rev. George Rouse. 12, <i>Leinster-gdns., Hyde-park, W.</i> ; and <i>Urbridge.</i>
1859	Lowe, Capt. W. Drury, A.D.C. to Inspector-General of Cavalry. <i>Burlington-hotel, Cork-street, W.</i>
1830	790 Lowry, Joseph Wilson, Esq. 45, <i>Robert-street, Hampstead-road, N.W.</i>
1830	*Lyell, Sir Charles, M.A., LL.D., F.R.S. 53, <i>Harley-street, Cavendish-square, W.</i>
1837	*Lynch, Capt. H. Blossie, C.B., Indian Navy, F.R.A.S. <i>Athenæum Club, S.W.</i>
1858	Lyne, Francis, Esq. 13, <i>Bristol-gardens, Maiden-hill, W.</i>

Year of  
Election.

- 1830 MacDonnell, John, Esq. 48, *Grove-end-road, St. John's-wood, N. W.*
- 1858 MacDougall, Alex. H., Esq. 44, *Parliament-street, Westminster, S. W.*
- 1859 • McGrath, John C., Esq. *Reform Club, S. W.*
- 1856 Macgregor, Alexander, Esq.
- 1855 McGregor, Duncan, Esq. *Board of Trade, S. W.; and Athenæum Club, S. W.*
- 1839 Macintosh, Lieut.-General Alex. Fisher, K.H. 7, *Tilney-street, Park-lane, W.*
- 1845 800\* Macintyre, Patrick, Esq., F.S.A., Off. Assoc. Inst. Act. 8, *Waterloo-place, Pall-mall, S. W.; and 13, Greville-place, Kilburn-priory, W.*
- 1859 Mackay, Rev. Alexander, A.M. *Rhynie, Aberdeenshire.*
- 1860 Mackay, Thomas Miller, Esq. 8, *Park-hill-road, Liverpool.*
- 1859 \*Mackean, Thos. W. L., Esq. 24, *Orford-square, Hyde-park, W.*
- 1845 Mackenzie, Right Hon. Hobs, F.R.A.S. *Athenæum Club, S. W.; and 28, Wimpole-street, W.*
- 1860 \*Mackenzie, James T., Esq. 69, *Lombard-street, E. C.*
- 1858 McKerrell, Robert, Esq. *Mauritius.*
- 1830 Mackillop, James, Esq., F.R.A.S. 30, *Grosvenor-square, W.*
- 1855 Mackinnon, Wm. Alex., Esq., M.P., F.R.S. 4, *Hyde-park-place, W.*
- 1860 Mackirdy, Lieut.-Col. David Edward, 69th Regt. *U. S. Club; and Tonghoo, Birma.*
- 1860 810 Maclean, William Crichton, Esq. *Custom-house, Farnmouth.*
- 1859 Maclear, Sir Thomas. *Astronomer Royal, Cape of Good Hope.*
- 1859 MacLeay, George, Esq. *Athenæum Club, S. W.; and Sydney.*
- 1852 McLeod, J. Lyons, Esq., late Consul for Mozambique.
- 1852 McLeod, Walter, Esq. *Head Master of the Royal Military Asylum, Chelsea, S. W.*
- 1855 Maclure, Andrew, Esq. 37, *Walbrook, E. C.*
- 1855 \*McClure, Captain Sir Robert J. Le M., R.N. *H.M.S. 'Esk.'*
- 1855 Macnab, John, Esq. *Stead's-place, Leith-walk, Edinburgh.*
- 1839 McNeil, The Right Hon. Sir John, G.C.B. *Granton, near Edinburgh.*
- 1856 \*Macpherson, Duncan, Esq., M.D., Inspector-General of Hospitals. *Madras.*
- 1845 820 Macqueen, James, Esq. 1, *Stanford-villas, Stanford-road, Kensington, W.*
- 1830 \*Magrath, Edward, Esq. *Hampstead-heath, N. W.*
- 1853 Majendie, Ashhurst, Esq., F.R.S. *Athenæum Club, S. W.; 152, Albany-street, Regent's-park, N. W.; and Hedingham-castle, Essex.*
- 1845 \*Major, Richard Henry, Esq. *British Museum, W. C.*
- 1858 Malby, John Walter, Esq. 8, *Swinton-street, Gray's-inn-road, W. C.*
- 1853 \*Malby, Thomas, Esq. 2, *Park-villas, Seven Sisters-road, Holloway, N.*
- 1843 \*Malcolm, W. E., Esq. *Burnfoot, Langholme, near Carlisle.*
- 1853 \*Mallet, Charles, Esq. *Audit Office, W. C.; and Belmont, Hampstead, N. W.*
- 1836 \*Manchester, James Prince Lee, Bishop of, F.R.S., &c. *Athenæum Club, S. W.; and Sedgley-hall, Manchester.*
- 1856 Mandeville, J. Henry, Esq., late H.M.'s Minister Plenipotentiary at Buenos Ayres. 11, *Rutland-gate, S. W.*
- 1830 830\* Mangles, Capt. James, R.N., F.R.S. *Fairfield, near Exeter.*
- 1856 Manning, Frederick, Esq. *Byron-lodge, Leamington.*
- 1859 Mantell, Wm. Walter, Esq. 47, *Mount-street, Grosvenor-square, W.*

Year of  
Election.

- 1859 Marett, Charles, Esq., M.A., Barrister-at-Law. 56, *Chancery-lane, W.C.*
- 1860 Mariette, Prof. Alphonse, M.A. 33, *Blundford-square, W.*
- 1830 \*Marjoribanks, Edward, Esq. 34, *Wimpole-street, W.*
- 1854 Markham, Clements Robert, Esq. *S. America.*
- 1836 \*Markham, Edward, Esq. 45, *Welbeck-street, Cavendish-square, W.*
- 1857 Marlborough, George, Duke of. *Blenheim, Woodstock.*
- 1857 \*Marsden, Robert C., Esq. 14, *Hunover-terrace, Regent's-park, N.W.*
- 1857 840 Marsh, Matthew Henry, Esq., M.P. *Oxford and Cambridge Club, S.W.*
- 1854 Marshall, James Garth, Esq. *Headingley, near Leeds, Yorkshire; and Monk Coniston, Ambleside.*
- 1859 \*Marsham, the Hon. Robert. *The Mote, Maidstone, Kent.*
- 1857 Marshman, J. C., Esq. 7, *Kensington-palace-gardens, W.*
- 1857 Martin, Francis P. B., Esq.
- 1859 Martin, Rr-Admiral Sir H. Byam, K.C.B. 16, *Carlton-house-terrace, S.W.*
- 1860 \*Martin, Richard Biddulph, Esq. 21, *Euton-square, S.W.*
- 1849 Martin, R. Montgomery, Esq. 23, *Gloucester-street, Camden-hill, Kensington, W.*
- 1830 \*Martineau, Joseph, Esq., F.Z.S., F.H.S. *Athenæum Club, S.W.; Busing-park, Alton, Hunts; and Whitbread's Brewery, E.C.*
- 1845 \*Matheson, Sir James, Bart., M.P., F.R.S. 13, *Cleveland-row, S.W.; and Achany, Bonar-bridge, Sutherlandshire, &c.*
- 1858 850 Mathieson, James Ewing, Esq. 77, *Lombard-street, E.C.; and 16, Queen's-gardens, Bayswater, W.*
- 1837 \*Maughan, Captain P., Indian Navy, F.R.A.S. 37, *Melville-street, Edinburgh.*
- 1855 May, Daniel John, Esq., R.N. *Livingstone Expedition.*
- 1858 Mayer, Joseph, Esq., F.S.A. 68, *Lord-street, Liverpool.*
- 1858 Mayo, John Pole, Esq. *Army and Navy Club, S.W.*
- 1860 \*Meinertzhagen, Daniel, Esq. 10, *Moorgate-street, E.C.; and 28, Devonshire-place, Portland-place, W.*
- 1854 Melvill, Colonel Peter M., Military Secretary to the Bombay Government.
- 1838 Melvill, Philip, Esq., F.R.A.S. *East India House, E.C.*
- 1842 \*Merivale, Herman, Esq., Under Sec. of State for the Colonies. *Colonial Office; and 26, Westbourne-terrace, W.*
- 1854 Methuen, Captain Robert. *Oriental Club, W.*
- 1860 860 Michell, Thomas, Esq. 47, *Upper Albany-street, Regent's-park.*
- 1859 Miland, John, Esq. 4, *Mount-street, Berkeley-square, W.*
- 1860 Miles, Rev. R. *Bingham, Notts.*
- 1853 \*Miller, Captain Thomas, R.N. *H.M.S. 'Clío,' and United Service Club, S.W.*
- 1857 Mills, Arthur, Esq., M.P. 34, *Hyde-park-gardens, W.*
- 1860 Milman, Capt. Everard, Madras Horse Artillery. 9, *Berkeley-square, W.*
- 1845 Milne, Alexander, Esq., C.B., Commissioner of Woods and Forests. 29, *St. James's-place, S.W.*
- 1853 Milnes, Richard Monekton, Esq., M.P. 16, *Upper Brook-street, W.; The Hall, Bunting; and Fryston-hall, Ferribridge, Yorkshire.*
- 1837 \*Milton, William Thomas, Viscount. 4, *Grosvenor-square, W.; and Wentworth-house, Rotherham, Yorkshire.*
- 1860 Mitchell, Alexander, Esq. 6, *Great Stanhope-street, Park-lane, W.*

Year of  
Election.

- 1859 870 Mitchell, William, Esq. 54, *Gracechurch-street, E.C.*
- 1851 \*Mocatta, Frederick D., Esq. 35, *Gloucester-place, Portman-square, W.*
- 1853 • Mocatta, George, Esq. *Sydney.*
- 1858 Moffat, Robert, Esq. *Government Surveyor, Hope Town and Kuruman, Cape of Good Hope.*
- 1853 Moffatt, George, Esq. 103, *Eaton-square, S.W.*
- 1860 \*Molson, Thomas, Esq. 1, *Molson-terrace, Montreal, Canada.*
- 1842 \*Montagu, Major Willoughby. *Clapham-common, S.*
- 1842 \*Monteagle, Thomas, Lord, F.R.S. 7, *Park-street, Westminster, S.W.; and Mount Trenchard, Linerick.*
- 1830 \*Montefiore, Sir Moses, Bart., F.R.S., F.R.S.N.A. 7, *Grosvenor-gate, Park-lane, W.; and East Cliff lodge, Ramsgate.*
- 1830 \*Monteith, Lieut.-General William, E.I.C. Eng., F.R.S. 11, *Upper Wimpole-street, W.; and Oriental Club, W.*
- 1859 880 Montgomerie, F. Butler, Esq. 2, *Cleveland-row, St. James's, S.W.; and St. Leonard's-on-Sea.*
- 1859 †Montgomerie, Capt. T. G., Bengal Engineers, 1st Assist, Trigonometrical Survey, *Dehra Dûn.*
- 1860 Montgomery, Robert Martin, Esq. 6, *Ashley-place, Victoria-street, S.W.*
- 1839 Moody, Lieut.-Colonel R. C., R.E. *British Columbia; and Junior United Service Club, S.W.*
- 1859 Moon, William, Esq. 104, *Queen's-road, Brighton.*
- 1857 \*Moor, Rev. Allen P., M.A., F.R.A.S. Sub-Warden *St. Augustine College, Canterbury.*
- 1854 Moore, Major J. A., F.R.S. 19, *Portland-place, W.*
- 1857 Moore, Captain John, R.N., C.B. *H.M.S. 'Hogue,' Greenwich.*
- 1857 Moore, Major-General W. Y. *United Service Club, S.W.*
- 1839 \*Morris, Charles, Esq. *University Club, S.W.*
- 1858 890 Mudie, Charles Edward, Esq. 13, *Russell-square, W.C.*
- 1858 Mueller, Ferdinand, Esq., M.D., PH. DR. *Director of the Botanical Gardens, Melbourne.*
- 1853 Muir, Thomas, Esq. 24, *York-terrace, Regent's-park, N.W.*
- 1859 Murchison, Capt. Kenneth R. *Bath.*
- 1830 \*Murchison, Sir Roderick Impey, G.C.ST.S., M.A., D.C.L., V.P.R.S., G.S., and L.S., Director-General of the Geological Survey of Great Britain and Ireland, Trust, Brit. Mus., Hon. Mem. R.S. of Ed., R.I.A., Mem. Acad. St. Petersburg, Berlin, Stockholm, Brussels, and Copenhagen, Corr. Ins. Fr., etc. etc. 16, *Belgrave-square, S.W.; and 28, Jermyn-street, S.W.*
- 1830 \*Murdock, Thomas W. C., Esq. 8, *Park-street, Westminster, S.W.; and Riverbank, Putney, S.W.*
- 1851 Murray, George, Esq.
- 1860 Murray, George T., Esq. *Shrivenham House, Shrivenham, Berks.*
- 1851 \*Murray, Capt. the Hon. Henry Anthony, R.N. 4D, *Albany-chambers, Piccadilly, W.*
- 1844 \*Murray, James, Esq. *Foreign Office, S.W.*
- 1830 900 Murray, John, Esq. 50, *Albemarle-street, W.; and Newstead, Wimbledon, S.W.*

Year of  
Election.

- 1860 \*Murray, Lieut. W., 68th Bengal Native Infantry, Topograph. Assist. G. Trig. Survey. *Mussoorie, India.*
- 1853 Napier, Col. George Thomas Conolly, C.B., Assistant Adjutant-General. *Junior United Service Club, S.W.*
- 1857 Napier, Hon. William. 22, *Green-street, Grosvenor-square, W.*
- 1857 Nares, Francis, Esq. *Athenæum Club, S.W.*
- 1859 \*Nasmyth, Capt. David J., 1st Assist. Trigonometrical Survey. *Bhooj, Bombay Presidency.*
- 1857 Nelthropp, George, Esq. 20, *Gloucester-street, Belgrave-road, S.W.*
- 1857 \*Neshitt, Henry, Esq. 8, *Hornsey-row, Canonbury, Islington, N.*
- 1859 \*Newcastle, Henry Pelham-Clinton, Duke of. *Clumber-park, Worksop Manor; and Nottingham Castle, Notts.*
- 1856 Newman, Thomas Holdsworth, Esq. 14, *Arlington-street, S.W.*
- 1856 910 Nicholson, Sir Charles, Bart., D.C.L., Chancellor of the University, Sydney. 65, *Cornhill, E.C.*
- 1844 †Nicolay, Rev. Chas. Grenfell. *Bahia.*
- 1836 Nicolson, Capt. Sir Frederick William Erskine, Bart., R.N. 14, *William-street, Lowndes-square, S.W.*
- 1858 Nix, John H., Esq. 77, *Lombard-street, E.C.*
- 1860 Nixon, Brinsley, Esq. *Athenæum Club, S.W.*
- 1857 Noddall, C. T. A., Commander R.N., Master Attendant at the Royal Clarence Victualling Yard, Gosport.
- 1857 \*Nolloth, Captain Matthew S., R.N. *United Service Club, S.W.; and Peckham, Surrey, S.E.*
- 1860 Norris, Harry, Esq. *Colonial Office; and 4, Little St. James-street, S.W.*
- 1856 North, Frederic, Esq., M.P. 3, *Victoria-street, Westminster, S.W.; and Hastings-lodge, Hastings.*
- 1830 \*Northumberland, Algernon, Duke of, Vice-Admiral, K.G., F.R.S., F.S.A., F.R.S.N.A., Pres. R.I. *Northumberland-house, Charing-cross, S.W.; Alnwick and Keilden Castles, Northumberland; Werrington-park, Cornwall; Sion-house, Middlesex, W.; and Stanwick-park, Yorkshire.*
- 1858 920 \*Oakeley, R. Banner, Esq. *Oswaldkirk-hall, Yorkshire.*
- 1855 O'Byrne, Robert, Esq. 9, *Adelphi-terrace, Strand, W.C.*
- 1856 O'Byrne, W. R., Esq. 9, *Adelphi-terrace, Strand, W.C.; and Cranford, Middlesex.*
- 1856 O'Connor, Col. Luke Smyth, C.B., Governor of the Gambia. *United Service Club, S.W.*
- 1858 Ogilvie, Edward D., Esq.
- 1859 Ogle, John W., Esq., M.D. 13, *Upper Brook-street, W.*
- 1855 Oliphant, Laurence, Esq. *Athenæum Club, S.W.*
- 1853 Oliveira, Benjamin, Esq., F.R.S. 8, *Upper Hyde-park-street, W.*
- 1845 \*Ommanney, Capt. Erasmus, R.N., F.R.A.S. 40, *Charing-cross, S.W.*
- 1838 \*Ommanney, H. M., Esq. *Blackheath, S.E.*

Year of Election.	
1856	930 O'Reilly, Commr. Montagu F., R.N. 4, <i>Brand-street, Greenwich, S.E.</i> ; and <i>H.M.S. 'Lapwing,' Mediterranean.</i>
1853	Osborn, Sir George R., Bart. <i>Travellers' Club, S.W.</i> ; and <i>Chicksand-priory, Beds.</i>
1856	Osborn, Capt. Sherard, R.N., C.B., Officier de Légion d'Honneur, etc. <i>Junior United Service Club, S.W.</i>
1852	Oswell, William Cotton, Esq. <i>Sea Larn, Ventnor, Isle of Wight.</i>
1860	Otter, Charles, Esq. 13, <i>Leinster-gardens, Hyde-park, W.</i>
1855	Otway, Arthur John, Esq. <i>Army and Navy Club, S.W.</i>
1854	†Ouchterlony, James, Esq. <i>Madras.</i>
1860	*Ouvry-North, the Rev. J. <i>East Acton, Middlesex, W.</i>
1844	*Overstone, Samuel, Lord, M.A., M.R.I. 2, <i>Carlton-gardens, S.W.</i> ; and <i>Wickham-park, Surrey.</i>
1854	Penham, Rev. William, M.A. <i>Harrow, Middlesex, N.W.</i>
1846	940*Oxford, Samnel Wilberforce, Bishop of, F.R.S., F.S.A. 26, <i>Pall-mall, S.W.</i> ; <i>Cuddesden Palace, Wheatley, Oxfordshire</i> ; and <i>Lavington, Sussex.</i>
1852	Packman, Fred. W. S., Esq., M.D. 12, <i>Clarges-street, Piccadilly, W.</i> ; and <i>Cup-ton-hall, Chesterfield, Derbyshire.</i>
1860	Paget, Arthur, Esq. <i>Cranmore Hall, Shepton Mallet, Somersetshire.</i>
1853	Pakington, Right Hon. Sir John Somerset, Bart., M.P. 41, <i>Eaton-square, S.W.</i> ; and <i>Westwood-park, Droitwich, Worcestershire.</i>
1856	†Palliser, Captain John. <i>Comrah, Kilmackthomas, Waterford</i> ; and <i>National Club, Whitehall-gardens, S.W.</i>
1855	Palmer, Major Edm., R.A. 1, <i>Wellington-terrace, Charlton, Blackheath, S.E.</i>
1838	*Palmer, Samuel, Esq.
1851	Palmerston, Henry John, Lord Viscount, M.P., K.G., G.C.B., F.R.S., &c. <i>Cam-bridge-house, Piccadilly, W.</i> ; and <i>Broadlands, Romsey, Hants.</i>
1849	*Parish, Commr. John E., R.N. <i>H.M.S. 'Ardent,' Army and Navy Club, S.W.</i> ; and <i>Quarry-house, St. Leonard's-on-Sea.</i>
1833	*Parish, Sir Woodbine, K.C.H., F.R.S., &c. <i>Quarry-house, St. Leonard's-on-Sea.</i>
1852	950 Parker, J. William, Esq., jun. 445, <i>West Strand, W.C.</i>
1850	†Parkes, Harry S., Esq., C.B. <i>Oriental Club, W.</i> ; and <i>H.B.M.'s Consul at Amoy, China.</i>
1850	*Parkyns, Mansfield, Esq., F.Z.S. <i>Arthur's Club, St. James's-street, S.W.</i> ; and <i>Woodborough-hall, Southwell.</i>
1854	Parr, Thomas Clements, Esq., M.A. 21, <i>West-mall, Clifton.</i>
1830	*Pasley, Lieut.-Gen. Sir Charles William, K.C.B., R.E., F.R.S. 12, <i>Norfolk-crescent, Hyde-park, W.</i>
1859	Pasteur, Marc Henry, Esq. 20, <i>Chester-street, S.W.</i>
1857	†Paton, Andrew A., Esq. <i>H.B.M.'s V.-Consul, Missolonghi, Greece.</i>
1858	Paul, Joseph, Esq. <i>Ormonde-house, Ryde, I. of Wight.</i>
1847	*Paynter, William, Esq., F.R.A.S. 21, <i>Belgrave-square, S.W.</i> ; and <i>Camborne-house, Richmond, Surrey, S.W.</i>
1855	Peabody, George, Esq. 22, <i>Old Broad-street, E.C.</i>
1853	960 Peacock, George, Esq. <i>Sturcross, near Exeter.</i>



Year of  
Election.

- 1853 \*Peckover, Alexander, Esq. *Wisbeach.*
- 1860 \*Peek, Henry William, Esq. *Wimbledon-house, S.W.*
- 1858 Peel, Sir Robert, Bart., M.P. 4, *Whitehall-gardens, S.W.; and Drayton Manor, Tamworth.*
- 1846 \*Pelly, Sir John Henry, Bart. *Upton, Essex.*
- 1830 \*Penn, Richard, Esq., F.R.S. 6, *Lancaster-place, Richmond, S.W.*
- 1853 Percy, Colonel the Hon. Hugh M. (Guards). 8, *Portman-square, W.*
- 1860 Perowne, Rev. J. J. Stewart, Divinity and Hebrew Lecturer. *King's College, W.C.*
- 1859 Perry, Sir Erskine, Member Indian Council. 36, *Eaton-place, S.W.*
- 1859 Perry, William, Esq., H.M.'s Consul, Panama. *Athenæum Club, S.W.*
- 1846 970 Petermann, Augustus, Esq., Ph. Dr., Hon. Memb. Berl. Geog. Soc. *Gotha.*
- 1857 \*Peters, William, Esq. 35, *Nicholas-lane, Lombard-street, E.C.*
- 1860 Petherick, John, Esq., H.M.'s Consul, Khartum. 8, *Cork-street, W.*
- 1858 Peto, Sir S. Morton, Bart., M.P. 12, *Kensington-park-gardens, W.*
- 1860 Petrie, Captain Martin, 14th Regiment. 4, *New-street, Spring-gardens, S.W.*
- 1854 Phelps, Wilham, Esq. 18, *Montagu-place, Russell-square, W.C.*
- 1857 Phillimore, Capt. Augustus, B.N. *Shiplake House, Reading; and U. S. Club, S.W.*
- 1859 Phillimore, Charles Bagot, Esq. *India House, E.C.*
- 1843 Phillimore, John George, Esq., Q.C. 19, *Old-buildings, Lincoln's-inn, W.C.*
- 1860 Phillimore, Wm. Brough, Esq., late Capt. Grenadier Guards. 5, *John-street, Berkeley-square, W.*
- 1830 980 \*Phillipps, Sir Thomas, Bart., M.A., F.R.S., F.S.A. *Athenæum Club, S.W.; and Middle-hill, Broadway, Worcestershire.*
- 1854 Phillipps, Major-General Sir B. Travell. *United Service Club, S.W.*
- 1856 Phillips, John, Esq., Solicitor. *Hastings.*
- 1854 Phillips, T. Bacon, Esq. 36, *Lansdowne-place, Brighton.*
- 1859 Phinn, Thomas, Esq., Q.C. 50, *Pall Mall, S.W.*
- 1852 \*Pike, Commander John W., R.N. 26, *Burlington-street, W.; Junior United Service Club, S.W.*
- 1855 Pilkington, James, Esq., M.P. *Reform Club, S.W.; and Blackburn.*
- 1851 \*Pim, Commander Bedford C. T., R.N. *Junior United Service Club, S.W.; and H.M.S. 'Gorgon.'*
- 1858 Pincott, James, Esq. *University College, London, W.C.; and Christchurch-road, Roupell-park, Brixton-hill, S.*
- 1859 Pinney, Colonel William, M.P. 30, *Berkeley-square, W.*
- 1858 990 Platen, His Excellency Count, Minister Plenipotentiary, Sweden and Norway. 49, *Grosvenor-place, S.W.*
- 1860 Plowden, Charles Hood C., Esq. 15, *York-street, Portman-square, W.*
- 1856 \*Plowes, John Henry, Esq. 39, *York-terrace, Regent's-park, N.W.*
- 1834 \*Pocock, John I., Esq. *Puckrup-hall, Tewkesbury.*
- 1855 \*Pollexfen, Capt. J. J. *India.*
- 1837 \*Pollington, John Charles George, Viscount, F.R.A.S. *Meshley-park, near Leeds.*
- 1853 Pollock, Lieut.-General Sir George, G.C.B. *Clapham-common, Surrey, S.*
- 1855 \*Ponsonby, Hon. Frederick G. B. 3, *Mount-street, Grosvenor-square, W.*

Year of  
Election.

- 1860 Pook, Captain John. 5, *Alpha-terrace, New Cross-road.*
- 1857 Pope, Captain W. A.
- 1853 1000 Porter, Edwd., Esq. *Athenæum Club, S.W.*; and 26, *Suffolk-st., Pall-mall, S.W.*
- 1855 Porter, Rev. J. Leslie, A.M. *Meadow Bank, Carrickfergus, Ireland.*
- 1830 \*Portlock, Maj.-General Joseph E., R.E., F.R.S. *War Department, 1, Whitehall-yard, S.W.*; and 58, *Queen's-gardens, Hyde-park, W.*
- 1859 Pottinger, Lieut.-Colonel William. *Junior United Service Club, S.W.*
- 1852 †Powell, Lewis, Esq. *Port Lewis, Mauritius.*
- 1859 Power, E. Rawdon, Esq. *Parthenon Club, S.W.*
- 1854 †Power, John, Esq. 25, *Sussex-place, Regent's-park, N.W.*; and *Panama.*
- 1854 Power, John Arthur, Esq., M.A., B.M. 52, *Burton-crescent, W.C.*
- 1856 Powys, the Hon. Thos., L.
- 1860 Pratt, Hodgson. 7, *Regency-square, Brighton.*
- 1853 1010 Price, Jas., Esq., M.D., F.R.C.S., &c. *Effra-road, Brixton, Surrey, S.*
- 1852 Price, James Glenie, Esq., Barrister-at-Law. 14, *Clement's-inn, W.C.*
- 1859 Price, Capt. R. Havard, 31st Bengal N. Infantry. *Bengal.*
- 1860 Prickett, Rev. Thomas William. *University Club, S.W.*; and *Hull, Yorkshire.*
- 1855 \*Pringle, Thomas Young, Esq. 14, *Eaton-square, S.W.*
- 1845 Prinsep, Henry T., Esq. *Little Holland-house, Kensington, W.*
- 1859 Pritchard, Wm. Thos., Esq. *H B.M.'s Consul, Fiji.*
- 1852 Prout, John William, Esq., M.A., Barrister-at-Law. *Athenæum Club, S.W.*; and *Newsdon-house, Willesden, Middlesex, N.W.*
- 1860 Puller, Arthur Giles, Esq. *Youngsbury, Ware.*
- 1844 Puller, Christopher W. Giles, Esq., M.P. *Athenæum Club, S.W.*; and *Youngsbury, Ware, Herts.*
- 1857 1020 Purcell, Edward, Esq., LL.D. 14, *Croom's-hill, Greenwich, S.E.*
- 1859 Purdon, Wm. H., Esq., Executive Engineer, Punjab. 94, *Wimpole-street, W.*
- 1854 \*Quin, Rear-Admiral Michael. *Senior U. S. Club, S.W.*; and 18, *Albion-villas, Albion-road, Islington, N.*
- 1858 \*Radstock, Graville Augustus, Lord. 30, *Bryanston-square, W.*
- 1853 Rae, John, Esq., M.D. 4, *Fenchurch-street, E.C.*; and *Canada.*
- 1859 Raikes, Henry, Esq., M.A. *Llangwin Hall, Mold, Flintshire.*
- 1851 \*Ramsay, Rear-Admiral Wm., C.B., F.R.A.S. *Junior U. S. Club, S.W.*; and 23, *Ainslie-place, Edinburgh.*
- 1859 Ratcliff, Charles, Esq., F.S.A. *National Club, S.W.*; *Edgbaston, Birmingham*; and *Downing College, Cambridge.*
- 1846 Ravenshaw, E. C., Esq., M.R.A.S. *Oriental Club, W.*; and 5, *Cavendish-square, W.*
- 1859 Ravenstein, Ernest G., Esq. *Topographical Dépôt, Spring-gardens, S.W.*
- 1844 1030 \*Rawlinson, Maj.-General Sir Henry C., K.C.B., D.C.L., F.R.S. *Athenæum Club, S.W.*
- 1838 Rawson, Rawson Wm., Esq., C.B., Colonial Secretary. *Cape of Good Hope.*
- 1857 Reed, William, Esq. *Oak Lodge, Addison-road, Kensington, W.*

Year of  
Election.

- 1858 †Rees, L. E. R., Esq. *Longman and Co., Paternoster-row, E.C.*
- 1859 Reeve, John, Esq. *Conservative Club, S.W.*
- 1856 Reid, Henry Stewart, Esq. *Bengal Civil Service.*
- 1857 Reid, Lestock R., Esq. *Athenæum Club, S.W.; and 122, Westbourne-ter., W.*
- 1830 \*Rennie, George, Esq., C.E., F.R.S., Hon. M.R.I.A. 39, *Wilton-crescent, Belgrave-square, S.W.; and Holmwood-lodge, near Dorking, Surrey.*
- 1830 \*Rennie, Sir John, C.E., F.R.S., F.S.A. 5a, *Spring-gardens, S.W.*
- 1834 \*Rennie, M. B., Esq., C.E. 39, *Wilton-crescent, Belgrave-square, S.W.*
- 1830 1040 \*Renouard, Rev. George Cecil, B.D., M.R.A.S. *Swanscombe-rectory, near Dartford.*
- 1830 \*Renwick, Lieutenant, R.E.
- 1858 Reynardson, Henry Birch, Esq. *Adwell, near Tetsworth, Oxfordshire.*
- 1860 Rich, Henry, Esq., M.P. 28, *Chapel-street, Grosvenor-square, W.*
- 1857 Richards, Capt. George H., R.N. *H.M.S. 'Plumper,' Pacific; and Torpoint, Cornwall.*
- 1830 \*Richardson, Sir John, R.N., M.D., C.B., F.R.S. *Lancrigg, Grasmere, Westmoreland.*
- 1859 Rickards, Henry Edward, Esq. *Drayton House, West Drayton, Middlesex.*
- 1860 Rintoul, Robert, Esq. *Wyndham Club, S.W.*
- 1830 \*Robe, Col. Fred. Holt, C.B. *U. S. Club, S.W.; and 16, Palace-gardens-terrace, Kensington, W.*
- 1860 Robertson, D. Brooke, Esq., H.M.'s Consul, Canton.
- 1860 1050 Robinson, Benjamin Coulson, Esq. 8, *King's Bench-walk, Temple, E.C.; and 43, Mecklenburg-square, W.C.*
- 1830 \*Robinson, Captain Charles G., R.N. 16, *Delamere-ter., Upper Westbourne-terrace, W.*
- 1859 Robinson, Capt. D. G. *Staff of the Great Trigonometrical Survey, Rawul Pindé, Punjab.*
- 1859 Robinson, Sir Hercules G. P. *Governor of Hong Kong.*
- 1855 Robinson, Thos. Fleming, Esq., F.L.S. 2, *Horatio-terrace, Ormond-road, Old Kent-road, S.E.*
- 1850 \*Robinson, Walter F., Esq., Commander R.N. *Junior United Service Club, S.W.*
- 1856 Roche, Antonin, Esq. *Educational Institute, Cadogan-gardens, Sloane-st., S.W.*
- 1830 \*Rodd, James Rennell, Esq. 40, *Wimpole-street, W.*
- 1860 Roe, John Septimus, Esq., Surveyor-General, Western Australia.
- 1830 \*Roget, Peter M., Esq., M.D., F.R.S. 18, *Upper Bedford-place, Russell-sq., W.C.*
- 1834 1060 \*Rose, the Right Hon. Sir George, F.R.S., LL.D. 4, *Hyde-park-gardens, W.; and 25, Southampton-buildings, Chancery-lane, W.C.*
- 1857 \*Rose, Wm. A., Esq., Alderman. 63, *Upper Thames-street, E.C.; and Befions, Crayford.*
- 1857 Ross, John, Esq., M.A. 2, *Brabant-court, Philpot-lane, E.C.*
- 1844 \*Rosse, William, Earl of, M.A., F.R.S. *Birrcastle, Parsonstown, King's County, Ireland.*
- 1839 \*Rous, Vice-Admiral the Hon. Henry John. 13, *Berkeley-square, W.*
- 1859 Rowden, Rev. G. Croke. *Oak Lawn, Weybridge.*
- 1856 Rucker, J. Anthony, Esq. *Blackheath, S.E.*

Year of  
Election.

- 1860 Rumley, Major-General Randall, v.p. Council of Military Education. 9, *Eaton-place, S. W.*
- 1858 \*Russell, Arthur John Edward, Esq., M.P. 2, *Audley-square, W.*
- 1830 \*Russell, Jesse Watts, Esq., D.C.L., F.R.S. *Ham-hall, Staffordshire.*
- 1830 1070 Russell, Lord John, M.P., F.R.S. 37, *Chesham-place, S. W.*; *Pembroke-lodge, Richmond, S. W.*; *Endsleigh-ho., Decon*; and *Gart-ho., near Callandar, N.B.*
- 1860 \*Russell, Wm. Howard, Esq., LL D. 18, *Sumner-place, Onslow-square, S. W.*
- 1860 Rutherford, John, Esq. 2, *Cavendish-place, Cavendish-square, W.*
- 1857 \*Ryder, Capt. Alfred P., R.N. *U. S. Club, S. W.*; and *Launde Abbey, Uppingham.*
- 1858 Ryder, John Northcote, Esq. *Messrs. Penn and Co., Greenwich.*
- 1852 \*Sabine, Major-General Edw., R.A., V.P.R.S., F.R.A.S., &c. &c. 13, *Ashley-place, Victoria-street, Westminster, S. W.*; and *Woolwich, S.E.*
- 1847 St. Asaph, Thomas Vowler Short, Bishop of. *Palace, St. Asaph, North Wales.*
- 1857 St. David's, Connop Thirlwall, Bishop of. *Abergwelly Palace, Carmarthen.*
- 1840 St. Leger, Anthony B., Esq. 10, *Berkeley-square, W.*; and 22, *Baker-street, Portman-square, W.*
- 1857 St. Vincent, Edward, Viscount. *Meaford Stone, Staffordshire.*
- 1845 1080 \*Salomons, David, Esq., M.P., Alderman, F.R.A.S. 3, *Great Cumberland-place, Hyde-park, W.*; and *Broom-hill, near Tunbridge Wells.*
- 1860 Sarel, Major H. A., 17th Lancers. *Army and Navy Club, S. W.*
- 1860 Sartoris, Alfred, Esq. 64, *Rutland-gate, S. W.*
- 1852 Saumarez, Captain Thomas, R.N. *Army and Navy Club, S. W.*; and *Milford, St. Helier's, Jersey.*
- 1838 Scarlett, Lieut.-General the Hon. Sir J. Yorke, K.C.B. *Portsmouth.*
- 1851 Scarlett, Lt.-Col. the Hon. W. F., Scots Fusilier Guards. 70, *Jermyn-st., S. W.*
- 1859 Scott, Lord Henry. *Belgrave-square, S. W.*
- 1855 Scott, Rear-Admiral James, C.B. *United Service Club, S. W.*
- 1840 \*Scrivener, J. F. P., Esq. 20, *Bryanston-square, W.*; and *Ramridge-house, near Andover, Hants.*
- 1830 \*Sedgwick, the Rev. A., Woodwardian Lecturer, M.A., F.R.S. *Athenæum Club, S. W.*; and *Cambridge.*
- 1858 1090 \*Serocold, Charles P., Esq. *Brewery, Liquorpond-street, E.C.*
- 1853 Sevin, Charles, Esq. 148½, *Fenchurch-street, E.C.*
- 1853 Sewell, Henry, Esq. 75, *Old Broad-st., E.C.*; and *Stamford-hill, N.*
- 1860 Seymour, Edward Adolphus F. St. Maw, Lord. *Junior United Service Club, S. W.*
- 1858 Seymour, George, Esq. 17, *Gracechurch-street, E.C.*; and 11, *Leinster-gardens, Hyde-park, W.*
- 1855 Seymour, Admiral Sir Geo. F., K.C.B., G.C.H. 115, *Eaton-square, S. W.*
- 1853 \*Seymour, Henry Danby, Esq., M.P. 39, *Upper Grosvenor-street, W.*; *Knollys-Hindon, Wilts*; and *Glastonbury, Somersetshire.*
- 1854 \*Shadwell, Captain Charles F. A., R.N., C.B. *H.M.S. 'Highflyer.'*
- 1856 Share, James Masters, Esq., R.N. *H.M.S. 'Calcutta,' East Indies*; and *Front-street, Tynemouth, Northumberland.*

Year of Election.	
1858	Shea, John, Esq., M.D., Surgeon R.N. 84, <i>Blackfriars-road, S.</i>
1846	1100 Sheffield, George A. F. C., Earl of. 20, <i>Portland-place, W.</i> ; and <i>Sheffield-park, Sussex.</i>
1857	Sheil, Major-Gen. Sir Justin, K.C.B. 13, <i>Eaton-place, Belgrave-square, S.W.</i>
1857	Shelburne, Henry, Earl of. <i>Lansdowne House, Berkeley-square, W.</i>
1860	Sheridan, Henry Brinsley, Esq., M.P. 32, <i>Ludgate-hill, E.C.</i>
1857	Sherrin, Joseph Samuel, Esq., LL.D. <i>Grammar School, Stowmarket.</i>
1859	*Sherwill, Major W. S., F.G.S. <i>Professor of Surveying, Civil Engineering College, Calcutta.</i>
1858	*Shipley, Conway M., Esq. <i>Army and Navy Club, S.W.</i> ; and <i>Raheny, Dublin.</i>
1856	Shuttleworth, Sir J. P. Kay, Bart. 38, <i>Gloucester-square, W.</i> ; and <i>Gavthorpe-hall, Burnley, Lancashire.</i>
1859	Silver, the Rev. Fred., M.A., F.R.A.S. <i>Norton Rectory, Market Drayton, Salop.</i>
1859	*Silver, Stephen Wm., Esq. 66, <i>Cornhill, E.C.</i> ; and <i>Norwood Lodge, Lower Norwood, S.</i>
1853	1110 Silver, William, Esq., M.A., Barrister-at-Law. <i>Addison-road, Kensington, W.</i>
1859	Sim, Captain Charles, R.E., Surveyor-General, Ceylon.
1853	Simmons, Edward R., Esq., Barrister-at-Law. 13a, <i>North Audley-street, W.</i>
1848	† Simmons, Colonel John L. A., R.E., C.B. <i>H. B. M.'s Consul, Warsaw</i> ; <i>Junior United Service Club, S.W.</i>
1853	Simpkinson, Lieut. Francis G., R.N. 55, <i>Victoria-street, Westminster, S.W.</i>
1857	Simpson, Sir George (Governor-in-Chief, Rupert Land). <i>Leschina, Canada East.</i>
1857	Sitwell, Major W. H. <i>Junior United Service Club, S.W.</i>
1858	Skelmersdale, Edward, Lord. <i>Lattom-park, Ormskirk, Lancashire.</i>
1860	*Smith, Augustus Henry, Esq. <i>Bron Ceris, Carnarvon, North Wales.</i>
1855	Smith, Rev. Brownrigg, M.A. <i>Shepherd-lane, Brixton, S.</i>
1859	1120 Smith, Edward, Esq. <i>Dublin Castle.</i>
1836	*Smith, Edward Osborne, Esq., F.S.A., &c. 21, <i>Cornwall-terrace, Regent's-park, N.W.</i>
1853	† Smith, George, Esq. <i>Peru.</i>
1857	Smith, George R., Esq. 73, <i>Eaton-square, S.W.</i> ; and <i>Telsden-park, Surrey.</i>
1860	Smith, Henry W. Seymour, Esq. <i>Sheen-mount, East Sheen, Surrey.</i>
1857	*Smith, Horace, Esq. <i>Broxbourne Borough, Hoddeston.</i>
1830	*Smith, James, Esq., F.R.S.L. & E. <i>Athenaeum Club, S.W.</i> ; and <i>Jordan-hill, Glasgow.</i>
1854	Smith, John, Esq., Memb. Geograph. Soc. Bombay. 7, <i>Mincing-lane, E.C.</i>
1853	Smith, John Harrison, Esq. 17, <i>Gracechurch-street, E.C.</i>
1853	Smith, John Henry, Esq. 16, <i>Pall Mall, S.W.</i> ; and <i>Purley, Croydon, Surrey.</i>
1838	1130 *Smith, Octavius Henry, Esq. <i>Thames-bank, Westminster, S.W.</i>
1857	Smith, Captain Philip, Grenadier Guards. 39, <i>Berkeley-square, W.</i>
1839	Smith, Rev. R. Carter. <i>Churilton Rectory, S.E.</i>
1841	*Smith, Thomas, Esq.
1860	Smith, William, Esq., C.E. 18, <i>Salisbury-street, Strand, W.C.</i>
1859	*Smith, W. Castle, Esq. 8, <i>Cumberland-terrace, Regent's-park, N.W.</i>

Year of  
Election.

- 1857 Smith, Wm. Gregory, Esq. *Hudson Bay Company, Fenchurch-street, E.C.*
- 1859 Smith, William Henry, Esq. 1, *Hyde-park-street, W.*
- 1837 \*Smyth, Captain William, R.N. *Conway House, Ryde, Isle of Wight.*
- 1830 \*Smyth, Vice-Admiral William Henry, K.S.F., D.C.L., F.R.S., V.P.S.A., F.R.A.S.,  
Hon. M.R.I.A., Corr. Inst. Fr., &c. &c. *Athenæum Club, S.W.; and St. John's-  
lodge, near Aylesbury, Bucks.*
- 1850 1140 \*Smythe, Colonel William J., R.A. *Royal Artillery Institution, Woolwich.*
- 1839 \*Somers, Charles, Earl. 33, *Prince's-gate, S.W.; Eastnor-castle, Hereford-  
shire; and The Priory, Reigate, Surrey.*
- 1858 \*Somes, Joseph, Esq. *Stratford, Essex, E.*
- 1855 Sopwith, Thomas, Esq., M.A., C.E., F.R.S. 43, *Cleveland-sq., Hyde-park, W.;  
and Allenheads, Haydon-bridge, Newcastle-on-Tyne.*
- 1845 Sotheby, Lt.-Col. Frederick S., C.B., F.R.A.S. 3, *Portugal-street, Mount-street, W.*
- 1858 Sotheby, Samuel Leigh, Esq. *The Woodlands, Norwood, S.*
- 1860 Southesk, James Carnegie, Earl of. *Kinnaird Castle, Brechin, N.B.*
- 1853 Southey, Henry Sedgfield, Esq., Barrister-at-Law. *Athenæum Club, S.W.*
- 1857 \*Speke, Capt. J. H. *Jordans, Ilminster, Somerset.*
- 1830 \*Spottiswoode, A., Esq. 12, *James-street, Buckingham-gate, S.W.*
- 1855 1150 \*Spottiswoode, William, Esq., F.R.S. 12, *James-street, Buckingham-gate, S.W.*
- 1859 \*Spiatt, Capt. Thos. A. B., R.N., C.B. *H. M. S. 'Medina,' Mediterranean.*
- 1857 Spring-Rice, Hon. S. E. (Deputy-Chairman of the Board of Customs). *Mount  
Trenchard, Fergus, Ireland.*
- 1859 Stafford, Edward W., Esq. *Colonial Secretary of New Zealand.*
- 1853 Stanford, Edward, Esq. 6, *Charing-cross, S.W.*
- 1855 Stanhope, Philip Henry, Earl, Pres. Soc. of Antiquaries. 3, *Grosvenor-place-  
houses, Grosvenor-place, S.W.; and Chevening, Seven Oaks, Kent.*
- 1856 Staniland, William, Esq., C.E. *The Crescent, Selby, Yorkshire.*
- 1856 Stanley, Edmund Hill, Esq. *Craven Hotel, Strand, W.C.*
- 1853 \*Stanley, Edward Henry, Lord, M.P., D.C.L. 23, *St. James's-square, S.W.*
- 1856 Statham, John Lee, Esq. *Cavendish Club, Regent-street, W.*
- 1836 1160 Staveley, Thomas, Esq. *Horwood House, Southborough, Tunbridge Wells.*
- 1858 Staveley, Thos. G., Esq. *Foreign Office; and 24, Cambridge-st., Hyde-park, W.*
- 1850 Steele, Colonel Thomas M., C.B., Coldstream Guards. 36, *Chester-square, S.W.*
- 1830 \*Stephen, Sir George.
- 1857 Stephenson, Sir R. Macdonald, C.E. 6, *Upper Hyde-park-gardens, W.*
- 1854 Stevens, Frederic Perkins, Esq. *Melbourne, Australia.*
- 1855 Stevens, Henry, Esq., F.S.A. 2, *Byng-place, Gordon-square, W.C.*
- 1841 Stevenson, Thomas, Esq., F.S.A. 37, *Upper Grosvenor-street, W.*
- 1860 \*Stewart, Capt. H. M. Shaw, Madras Engineers. *E. I. United Service Club, St.  
James's-square, S.W.; and China.*
- 1860 Stewart, Major Patric, Bengal Engineers. *Junior United Service Club, S.W.\**
- 1860 1170 Stirling, Commander Frederick Henry, R.N. *H. M. S. 'Hero.'*
- 1841 Stirling, Vice-Admiral Sir James. *Senior United Service Club, S.W.*
- 1860 \*Stirling, William, Esq., M.P. 128, *Park-st., Grosvenor-sq., W.*
- 1860 Stocker, John Palmer, Esq. 93, *Oxford-terrace, Hyde-park, W.*

Year of Election.	
1858	Stoddart, George, Esq. <i>H. B. M.'s Consul, Madeira.</i>
1845	*Stokes, Capt. John Lort, R.N. <i>United Service Club, S.W.; and Haverford-west, Wales.</i>
1858	Stopford, Capt. James J., R.N. 4, <i>Norfolk-crescent, Hyde-park, W.</i>
1858	Stopford, James Sydney, Esq. 18, <i>Savile-row, W.</i>
1858	Strangford, Percy Ellen, Viscount. 19, <i>Mansfield-street, W.</i>
1858	Stratford de Redcliffe, Stratford Canning, Viscount. 29, <i>Grosvenor-square, W.</i>
1853	1180 Strutt, George H., Esq., F.R.A.S. <i>Bridgehill, Belper.</i>
1858	Strutt, Captain Hammel Ingold. <i>Examiner Royal Mail Steam Company, Southampton.</i>
1859	*Strutt, Captain William. <i>Palace, Kew.</i>
1853	*Strzelecki, Count P. E. de, C.B., F.R.S. 20b, <i>Savile-row, W.</i>
1859	Stuart, Lieut.-Col. J. F. Dudley Crichton, M.P., Grenadier Guards. 28, <i>Charles-street, St. James's, S.W.</i>
1834	*Sturge, Thomas, Esq. <i>Northfleet, Kent.</i>
1833	Sturt, Capt. Charles, F.L.S. <i>St. Edmund's, Tivoli, Cheltenham.</i>
1853	Stutfield, William, Esq. 15, <i>Leinster-terrace, Westbourne-terrace, W.</i>
1857	Sullivan, Captain Bartholomew J., R.N., C.B. <i>Board of Trade, S.W.</i>
1856	Sutherland, Kenneth L., Esq., Paymaster R.N., Barrister. <i>Junr. U.S. Club, S.W.; 3, Mulgrave-place, the Hoe, Plymouth; and H.M.S. 'Royal Albert,' Devonport.</i>
1853	1190† Sutherland, Peter C., Esq., M.D. <i>Natal.</i>
1840	*Sutherland, Robert, Esq. <i>Glencoe-house, by Appin, N.B.</i>
1857	Swanzy, Andrew, Esq. 38, <i>Cannon-street, E.C.</i>
1857	*Sweeting, Robert, Esq. 7, <i>Clement's-lane, Lombard-street, E.C.; and London-hill, Harrow.</i>
1836	*Swiuburne, Rear-Admiral Charles H. 18, <i>Grosvenor-place, W.; and Capheaton, near Newcastle-upon-Tyne.</i>
1859	Sykes, Christopher, Esq. <i>Sledmere, Malton.</i>
1851	Sykes, Colonel William Henry, M.P., F.R.S., Hon. M.R.I.A. <i>Athenæum Club, S.W.; and 47, Albion-street, Hyde-park, W.</i>
1852	*Synge, Major Millington H., R.E. <i>Curragh Camp, Ireland.</i>
1852	Tagart, Courtenay, Esq. <i>Reform Club, S.W.; and Paris.</i>
1859	Tagart, Francis, Esq. 31, <i>Craven-hill-jardens, Hyde-park, W.</i>
1857	1200* Tait, Robert, Esq. 5, <i>Queen Anne-street, W.</i>
1856	Taylor, George Cavendish, Esq. <i>Army and Navy Club, S.W.</i>
1854	*Taylor, John Stopford, Esq., M.D. 1, <i>Springfield, St. Anne-street, Liverpool.</i>
1857	Teesdale, John M., Esq. 9, <i>Norfolk-square, Hyde-park, W.</i>
1860	Templeton, John, Esq. <i>Gibson-square, Islington, N.</i>
1857	Tennant, Professor James. 149, <i>Strand, W.C.</i>
1859	Tennant, Major J. F., Bengal Engrs. <i>Care of the Dpty. Survr.-General, Calcutta.</i>
1830	*Thatcher, Colonel, E.I.C.
1854	Thomas, Henry Harrington, Esq. <i>Lansdowne-crescent, Bath.</i>
1859	Thompson, Thomas A., Esq. <i>London and County Bank, Cambridge.</i>
1854	1210 Thompson, William C., Esq. 81, <i>Cambridge-terrace, Hyde-park, W.; and Royal Cork Yacht Club, Queenstown.</i>

Year of Election.	
1848	*Thomson, J. Turnbull, Esq. <i>Chief Surveyor, Otago, New Zealand.</i>
1854	*Thomson, Thomas, Esq., M.D. <i>Calcutta.</i>
1847	Thornton, Rev. Thomas Cooke, M.A., M.R.I. <i>Brock-hall, Northamptonshire.</i>
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1854	Thorold, Henry, Esq. 35, <i>Gloucester-square, W.</i>
1859	Thuillier, Major H. L., Superintendent of Revenue Survey of India. <i>Calcutta.</i>
1853	Tilleard, James, Esq. <i>Education Department, Council Office, Downing-street, S.W.; and 10, Woodland Cottages, Turnham-green, W.</i>
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1853	*Tomline, George Taddy, Esq., F.S.A. 21, <i>Old-buildings, Lincoln's-inn, W.C.; and Ash, near Sandwich, Kent.</i>
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1857	Tudor, Henry, Esq. 46, <i>Westbourne-terrace, W.</i>
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1858	Twyford, A. W., Esq. <i>Bengal Cavalry; Reform Club, S.W.; and Clayton Wickham, Hurstpierpoint, Sussex.</i>
1859	Tytler, Capt. W. Fraser. <i>Aldourie, Interness.</i>
1858	*Uzielli, Theodosius, Esq. 114, <i>Piccadilly, W.</i>
1844	*Vacher, George, Esq. 29, <i>Parliament-street, S.W.</i>
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1857	Vardon, Thomas, Esq. <i>Library, House of Commons, Palace, Westminster, S.W.</i>
1856	*Vaughan, James, Esq., F.R.C.S., Bombay Army. <i>Bombay.</i>



Year of Election.	
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1852	1250* Vavasour, Sir Henry M., Bart. <i>Travellers' Club, S.W.; and Spaldington-hall, Yorkshire.</i>
1855	Vavasseur, James, Esq. 2, <i>De Crespigny-park, Denmark-hill, S.</i>
1860	Verbeke, Frederick, Esq. 41, <i>Victoria-street, Westminster, S.W.</i>
1837	*Verney, Major Sir Harry C., Bart., M.P., F.R.A.S. <i>Travellers' Club, S.W.; 32, South-street, Grosvenor-square, W.; and Claydon-house, Bucks.</i>
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1852	Verulam, James Walter, Earl of. <i>Gorhambury, near St. Alban's; Barry-hill, Surrey; and Messing-hall, Essex.</i>
1859	Vesey, Arthur, Esq. <i>Long Ditton, Kingston, Surrey, S.W.</i>
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1830	*Vidal, Vice-Admiral Alex. T. E. 10, <i>John-street, Adelphi-hill, W.C.</i>
1840	Vigne, G. T., Esq. <i>The Oaks, Woodford, N.E.</i>
1857	1260 Vincent, John, Esq., Barrister-at-law. 4, <i>Lamb-buildings, Temple, E.C.</i>
1858	Vines, William Reynolds, Esq., F.R.A.S. <i>The Elms, Ealing, W.</i>
1838	*Vyvyan, Sir R. Rawlinson, Bart., F.R.S. <i>Trelowarren, Cornwall.</i>
1857	Vyvyan, Richard H. S., Esq., F.R.A.S. <i>Conservative Club, S.W.; and Trevan St. Colomb, Cornwall.</i>
1846	Wade, Sir Claude Marten. 16, <i>Queen-square, Bath.</i>
1852	Wade, Captain Mitchell B. 66, <i>St. John-street, Liverpool.</i>
1853	*Wagstaff, William Racster, Esq., M.D., M.A. <i>Thornton-house, Clapham-road, S.</i>
1856	Waldegrave, the Hon. Geo. <i>Assis. Librarian House of Commons, S.W., 4, Harley-st, W.</i>
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1858	*Walker, Captain John, H.M.'s 66th Foot. 13, <i>Westbourne-street, Hyde-park-gardens, W.</i>
1856	Walker, Joshua, Esq. 40, <i>Upper Hurley-street, W.</i>
1860	Walker, Robert, Esq., M.D., Assist. Surgeon R.N. <i>H.M.S. 'Hannibal.'</i>
1853	Walker, Captain William Harrison, H.C.S. 103, <i>Gloucester-terrace, W.; and Board of Trade, S.W.</i>
1854	†Wallace, Alfred Russell, Esq. <i>Indian Archipelago.</i>
1860	Walpole, Capt. the Hon. F. <i>Travellers' Club; and Rainthorpe Hall, Long Strutton, Norfolk.</i>
1858	Walrond, Theodore, Esq., M.A.
1853	Walter, Henry Fraser, Esq. <i>Papplewick-hall, near Nottingham.</i>
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1860	Ward, Captain J. Hamilton, R.N. <i>Sydney Lodge, Torquay.</i>
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1851	Warre, John Ashley, Esq., M.P., F.R.S. 54, <i>Lowndes-square, S.W.; and West-cliff, Rumsjute.</i>
1830	Washington, Capt. John, R.N., F.R.S. <i>Hydrographer to the Navy, Admiralty.</i>

Year of Election.	
1852	Watkins, John, Esq., F.R.C.S., F.S.A. 2, <i>Falcon-square, Aldersgate-street, E.C.</i>
1859	Watson, James, Esq. 24, <i>Endsleigh-street, W.C.</i>
1858	Watson, Josh. John Win., Esq., C.E., PH. DR.
1853	Watts, J. King, Esq. <i>St. Ices, Huntingdonshire.</i>
1857	*Waugh, Lt.-Colonel Andrew Scott, Bengal Engineers, Surveyor-General and Superintendent Great Trigonometrical Survey. <i>India.</i>
1858	1290*Webb, Capt. Sydney. 24, <i>Manchester-square, W.</i>
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1851	Weller, Edward, Esq. 34, <i>Red Lion-square, W.C.</i>
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1859	Westgarth, William, Esq. 20, <i>Threadneedle-street, E.C.</i>
1853	Westmacott, Arthur, Esq. <i>Conservative Club, St. James's-street, S.W.</i>
1852	1300†Westmacott, Lieut.-Colonel, R.M. <i>Junior United Service Club, S.W.</i>
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1837	*Whewell, Rev. William, D.D., F.R.S., F.S.A., Vice-Chancellor, Cambridge. <i>Athenæum Club, S.W.; and Lodge, Cambridge.</i>
1853	*Whinfield, Edward Wrey, Esq., B.A. <i>Bovington-lodge, Hemel-Hempstead, Herts.</i>
1837	Whinyates, Lieut.-General E. C., R.A., C.B., K.H. <i>Dorset Villa, Cheltenham.</i>
1839	1310*Whishaw, James, Esq., F.S.A. 16, <i>York-terrace, Regent's-park, N.W.</i>
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1849	Whitmore, George, Esq. 28, <i>Oxford-square, W.</i>
1860	Wilkinson, Captain A. Eastfield, B.A., 7th Hussars. <i>Army and Navy Club.</i>
1854	Wilkinson, Frederick E., Esq. <i>Sydenham, Kent, S.E.</i>
1839	*Wilkinson, Sir John Gardner, D.C.L., F.R.S. <i>Athenæum Club, S.W.; and 33, York-street, Portman-square, W.</i>
1857	1320Willcock, J. W., Esq., Q.C. <i>Stone-buildings, Lincoln's-inn; and Rosenstead, Avenue-road, St. John's-wood, N.W.</i>
1857	Williams, Edwin, Esq. 137, <i>Fenchurch-street, E.C.</i>

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Election.

- 1856 Williams, Henry Jones, Esq. *Club Chambers, S. W.; and 82, King William-st., E.C.*
- 1856 Williams, Henry R., Esq. *Board of Trade, S. W.*
- 1858 Williams, Robert F., Esq. *76, Coleshill-street, Eaton-square, S. W.*
- 1857 Williams, Major-General Sir Wm. F., Bart., K.C.B., D.C.L. *Army and Navy Club, S. W. Commander-in-Chief, Canada.*
- 1830 \*Willich, Charles M., Esq. *25, Suffolk-street, Pall-mall-east, S. W.*
- 1857 Willis, Captain William A., R.N. *Royal Hospital, Greenwich, S.E.*
- 1860 Willock, Major George. *Athenæum Club, S. W.; and Bath.*
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- 1859 1330 Willoughby, Henry W., Esq. *4, Bedford-square, W.C.*
- 1854 \*Wilson, Captain Thomas, R.N. *Army and Navy Club, S. W.*
- 1860 Wilson, Thomas, Esq. *14, Hyde-place, N.*
- 1854 Wodifield, Robert Denby, Esq. *Conservative Club, S. W.; and 24, Connaught-square, W.*
- 1846 Wolff, Rev. Joseph, D.D. *Isle Brewers, Somerset.*
- 1859 Wombwell, C. Orby, Esq.
- 1853 Wood, Right Hon. Sir Charles, Bart., G.C.B., M.P. *10, Belgrave-square, S. W.; and Hickleton, Yorkshire.*
- 1857 Woodhead, Captain H. J. Plumridge. *1, James-street, Adelphi, W.C.*
- 1845 Worthington, Rev. James, D.D. *27, John-street, Bedford-row, W.C.*
- 1856 Worthington, J. Hall, Esq. *Liverpool.*
- 1857 1340 Wortley, Rt. Hon. James Stuart, Q.C. *29, Berkeley-square, W.; and Sheen, Surrey, S. W.*
- 1860 Wright, Rev. Henry P., Chaplain to the Forces. *Canterbury.*
- 1839 \*Wyld, James, Esq., M.P. *Charing-cross, W.C.*
- 1858 Wynne, Rt. Hon. John, M.P. *National Club, S. W.; and Haslewood, Sligo.*
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- 1854 Yeats, John, Esq., LL.D. *Leicester-house, Peckham, S.E.*
- 1859 Yorke, Lieut.-General Sir Charles, K.C.B. *19, South-st., Grosvenor-square, W.*
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- 1857 \*Ynung, Capt. Allen. *Riversdale, Twickenham, S. W.*
- 1838 \*Ynung, Charles Baring, Esq. *4, Connaught-place-west, Hyde-park, W.*
- 1830 1350 \*Ynung, George Frederick, Esq. *Limehouse, E.*
- 1858 Young, James, Esq. *Sardinia-terrace, Glasgow.*
- 1830 \*Young, James, Esq.
- 1853 Yonng, Thomas, Esq. *14, Eaton-square, S. W.*
- 1857 Ynle, Capt. Henry, Bengal Engineers. *India; and Messrs. Dudgeon and Co., 1, New Bank-buildings, E.C.*

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NEW HAVEN . .	Yale College Library	WASHINGTON .	Congress Library of
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		WORCESTER . .	Antiquarian Society

## AUSTRALASIA.

\*ADELAIDE . . . . . South Australian Institute.  
 \*AUSTRALIA, SOUTH . . . . . Philosophical Institute of.  
 TASMANIA . . . . . The Royal Society of.

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HAS BEEN AWARDED.

- 1831.—Mr. RICHARD LANDER, for the discovery of the course of the River Niger or Quorra, and its outlet in the Gulf of Benin.
- 1832.—Mr. JOHN BISCOE, for the discovery of the land now named "Enderby Land" and "Graham Land," in the Antarctic Ocean.
- 1833.—Captain Sir JOHN ROSS, R.N., for discovery in the Arctic Regions of America.
- 1834.—Sir ALEXANDER BURNES, for the navigation of the River Indus, and a journey by Balkh and Bokhara, across Central Asia.
- 1835.—Captain Sir GEORGE BACK, R.N., for the discovery of the Great Fish River, and its navigation to the sea on the Arctic Coast of America.
- 1836.—Captain ROBERT FITZROY, R.N., for the survey of the shores of Patagonia, Chile, and Peru, in South America.
- 1837.—Colonel CHESNEY, R.A., for the general conduct of the "Euphrates Expedition" in 1835-6, and for accessions to the geography of Syria, Mesopotamia, and the Delta of Susiana.
- 1838.—Mr. THOMAS SIMPSON—Founder's Medal—for the discovery and tracing, in 1837 and 1838, of about 300 miles of the Arctic shores of America.
- Dr. EDWARD RÜPPELL—Patron's Medal—for his travels and researches in Nubia, Kordofán, Arabia, and Abyssinia.
- 1839.—Col. H. C. RAWLINSON, E.I.C.—Founder's Medal—for his travels and researches in Susiana and Persian Kurdistan, and for the light thrown by him on the comparative geography of Western Asia.

- 1839.—Sir R. H. SCHOMBURGK—Patron's Medal—for his travels and researches during the years 1835-9 in the colony of British Guayana, and in the adjacent parts of South America.
- 1840.—Lieut. RAPER, R.N.—Founder's Medal—for the publication of his work on "Navigation and Nautical Astronomy."  
——— Lieut. JOHN WOOD, I.N.—Patron's Medal—for his survey of the Indus, and re-discovery of the source of the River Oxus.
- 1841.—Captain Sir JAMES CLARK ROSS, R.N.—Founder's Medal—for his discoveries in the Antarctic Ocean.  
——— Rev. Dr. E. ROBINSON, of New York—Patron's Medal—for his work entitled "Biblical Researches in Palestine."
- 1842.—Mr. EDWARD JOHN EYRE—Founder's Medal—for his explorations in Australia.  
——— Lieut. J. F. A. SYMONDS, R.E.—Patron's Medal—for his survey in Palestine, and levels across the country to the Dead Sea.
- 1843.—Mr. W. J. HAMILTON—Founder's Medal—for his researches in Asia Minor.  
——— Prof. ADOLPH ERMANN—Patron's Medal—for his extensive geographical labours.
- 1844.—Dr. BEKE—Founder's Medal—for his extensive explorations in Abyssinia.  
——— M. CHARLES RITTER—Patron's Medal—for his important geographical works.
- 1845.—Count P. E. DE STRZELECKI—Founder's Medal—for his explorations and discoveries in the South-Eastern portion of Australia, and in Van Diemen's Land.  
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- 1846.—Captain CHARLES STURT—Founder's Medal—for his various and extensive explorations in Australia.  
——— Dr. LUDWIG LEICHHARDT—Patron's Medal—for a journey performed from Moreton Bay to Port Essington.
- 1847.—Sir JAMES BROOKE, Rajah of Sarawak and Governor of Labuan—Founder's Medal—for his expedition to Borneo.  
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- Nautical Monographs. No. 1. (2 copies.) Washington, 1859.  
Rear-Admiral R. FITZROY, F.R.G.S.
- A Panoramic View of the Four great Austrian Forts, viz., Mantua, Verona, Peschiera, and Legnago. (3 copies on stone.) By A. Maclure. 1859.  
The AUTHOR.
- Projets de Chemins de Fer et de Lignes de Télégraphie. Extrait de la Mappemonde, dédiée à S. M. l'Impératrice, par M. V. Ste. A. With 1 sheet of letter-press.
- Three Maps to illustrate a method of Great Circle-Sailing. By W. C. Bergen, Master in the Mercantile Marine. With a Book of Tables. Blyth, Northumberland, 1859. The AUTHOR.
- View of the Alpine Feast (called Stubeten), Appenzell. Sentis Mountain.  
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# CHRONOMETERS AND INSTRUMENTS LENT OUT.

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To the late MR. DUNCAN, Vice-Consul at Whydah, in 1849—  
 Telescope.  
 Two Compasses.  
 Aneroid Barometer.

DR. P. C. SHERLAND, at Natal, F.R.G.S.—

Pocket Chronometer, by Brokbank and Atkins. No. 835.  
 Portable Altitude and Azimuth Instrument, by Robinson.  
 Brass Sextant (7½-inch), with Silver Limb, by Troughton and Simms.  
 Strong-framed Artificial Horizon, by Troughton and Simms.  
 Prismatic Pocket Compass, by Troughton and Simms.  
 Thermometrical Boiling Water Apparatus, for Heights.  
 Two Newman's Improved Iron Cistern Mountain Barometers.

The late DR. E. J. IRVING, at Abeokuta, F.R.G.S.—

Pocket Chronometer, by Barraud and Lund.  
 Mountain Barometer, by Troughton and Simms.

CONSUL M'LEOD, at Mozambique, F.R.G.S.—

Brass Sextant (7½-inch), divided on Gold by Dollond.  
 Achromatic Telescope, 3½ feet, 2 inches aperture.

MR. POGSON, of Oxford—

Box Chronometer, by Molyneux.

DR. LIVINGSTONE, F.R.G.S.—

Sykes's Hypsometrical Apparatus, No. 1, with Sling Case. By Casella.  
 Halleur's " " No. 3 " "  
 Standard Thermometers, 0 to 212, in Brass Cases. "  
 " " in Maroon Cases. "  
 Artificial Horizon, with Sling Case. "  
 Prismatic Azimuth Compass, silver ring, with leather Sling Case. "

CAPT. R. F. BURTON, East Africa Expedition—

Four Thermometrical Boiling Water Apparatus for Heights. By Casella.

## PRESENTATION

OF THE

## GOLD MEDALS

TO LADY FRANKLIN AND TO CAPTAIN SIR F. L. MCCLINTOCK.

THE President, the EARL DE GREY AND RIXON, read the following statements explanatory of the grounds on which the Council had awarded the Royal Medals respectively :—

Desirous of commemorating in an especial manner the Arctic researches of our associate the late Sir John Franklin, and of testifying to the fact that his expedition was the first to discover a North-West Passage, the Council of the Royal Geographical Society have awarded the Founder's Gold Medal to his widow, Lady Franklin, in token of their admiration of her noble and self-sacrificing perseverance in sending out, at her own cost, several searching expeditions, until at length the fate of her husband has been finally ascertained.

The Council have farther adjudicated the Patron's Gold Medal to Captain Sir F. L. McClintock, R.N., for the consummate skill and unflinching fortitude with which, in the *Fox* yacht, he and his gallant companions have not only enlarged our acquaintance with Arctic geography, but have also brought to light the precious "Record" which has revealed to us the voyage and final abandonment of the *Erebus* and *Terror*.

In making these awards, it is but right to recall attention to some of the leading facts connected with this subject.

Having already taken part in two of Nelson's glorious victories and in other battles of the old war, Sir John Franklin began his Arctic explorations in the years 1818 to 1822, and subsequently, by his researches in 1825 to 1827, he had already acquired a renown second only to that of Parry. Aspiring, however, to the supreme object of his ambition—the discovery of a North-West Passage—he again left our shores in 1845 to accomplish that great mission.

In ascertaining the date and place of the death of Franklin, M'Clintock and his companions have also effected several important geographical discoveries. Lands and seas which had hitherto been entirely unknown to geography have by their energy and ability been laid open.

Owing thus to the devotion of Lady Franklin and the skill of Captain M'Clintock, it is now demonstrated that the *Erebus* and *Terror* ascended Wellington Channel to the  $77^{\circ}$  of north latitude; that the two ships were navigated round Cornwallis Land, which was thus proved to be an island; and that finally, steering from Beechey Island to the south-west, they were, on the 12th of September, 1846, beset in the ice, in which they wintered in latitude N.  $70^{\circ} 5'$  and longitude W.  $98^{\circ} 23'$ , having reached a position never before or since attained by any other ship.

In placing the *Erebus* and *Terror*, in 1846, in this position, it is clear that the Franklin expedition, whose commander, with others,\* had previously ascertained the existence of a channel along the North coast of America, with which the frozen sea, wherein he was beset, had a direct communication, had thus, in a geographical sense, firmly established the existence of a North-West Passage.

Having by this great feat rendered his name illustrious, the Council deem it to be an act of justice that as Ross, Back, Simpson, Rae, Inglefield, M'Clure, Kane, and Collinson have each been rewarded by a Medal of this Society for their distinguished Arctic researches, so the list of such worthies cannot be more appropriately enriched than by offering the Patron's Medal of the year to the consecration of the *deeds of Franklin*.

In so doing the Council have indeed a peculiar satisfaction in awarding this Medal to the relict of the great navigator, in admiration of the single-minded and undaunted energy which animated her endeavours, and which have terminated in clearly ascertaining that, in sacrificing their lives, Franklin and his brave companions died in solving the long-sought geographical problem.

The Council therefore hope that Lady Franklin will consider the Gold Medal now awarded to her not only as the merited recompense of her husband's discoveries, but will also accept it as a testimony of the admiration entertained by British geographers for her who has devoted the last twelve years of her life to this glorious object, in accomplishing which she has sacrificed so large a portion of her worldly means.

\* Beechey, Hearne, Mackenzie, Richardson, &c.



But all the devotion of a Lady Franklin and the efforts of the British nation might well have failed in unravelling the fate of the *Erebus* and *Terror*, had not such a commander been selected for the *Fox* as Captain Sir F. L. M'Clintock.

Inured by previous explorations to the risks and dangers of Arctic life, this brave officer has so modestly and clearly told his stirring tale of how in a yacht of 170 tons he successfully worked out his great mission that he has already enlisted the sympathies of Europe and America.

He has also imperishably chronicled in the exploits of the expedition the names of his worthy associates Hobson, Young, Walker, and Petersen, in a work which will doubtless endure as long as men shall continue to revere the deeds of such persevering and skilful explorers.

Of the events in this narrative there is no one which has drawn forth more commendation than the calm resolve with which the gallant commander, after having been driven back 1200 miles in the "pack," and carried out into the Atlantic, returned to combat with the obstacles of frozen seas, and, nothing disheartened, steered back his little yacht once more into Baffin Bay.

Marking the judgment and sagacity he showed throughout the whole of an expedition which terminated in making known the extent of the discoveries of Franklin, as well as the place and date of his death and the almost certain fate of those gallant companions, Crozier, Fitzjames, and others who survived him, the Council have the satisfaction of recording that the commander and officers of the *Fox* have also added vastly to geographical knowledge.

In proving that Bellot Strait is navigable, they have demonstrated that its southern shore really constitutes the most northern promontory of North America, in rounding which and in sledging along the western shores of Boothia M'Clintock has given us reason to believe that, in some favourable season, the passage, even by a ship, may possibly be effected from Baffin Bay into the long and tortuous channel which Collinson so recently navigated.

Again, while the researches of Lieutenant, now Commander, Hobson not only delineated for the first time the western shores of King William Island, but were signalled by the detection of the precious "Record" of the discoveries and last days of Franklin, with many relics, the indefatigable journeys of the gallant and generous volunteer Captain Allen Young have not only determined the outlines of a large portion of Prince of Wales Island, hitherto

entirely unvisited, but have gone far to satisfy geographers that the ice-choked channel to which the name of M'Clintock has been attached, rarely, if ever, offers a free passage for ships.

For these successful results, obtained with very slender means and under the severest trials, the Patron's Medal is bestowed on the leader of this last expedition, whose services have already received the warm approbation of his Sovereign and his country, and who will doubtless rejoice in knowing that he is on this occasion the recipient of the same honour as that which is adjudged to the noble-minded widow of Franklin.

The President then handed the Founder's Gold Medal to Sir Roderick I. Murchison, who, on behalf of Lady Franklin, replied—

“Connected as I have been with the Royal Geographical Society since its foundation, I can assure you, my Lord, that no event relating to our body has given me greater satisfaction than the unanimous and hearty acquiescence of the Council in the proposal which I made to them to grant our Founder's Medal to Lady Franklin.

“Having presided over the geographers fifteen years ago, when my dear friend Franklin last left our shores, it naturally became me, in the following years, when we began to be anxious about the fate of the *Erebus* and *Terror*, that I should advocate every search, both public and private, which might throw a light upon the voyage of those vessels; and I have thus had abundant opportunities of observing and testing the sterling qualities of a woman who has proved herself to be worthy of the admiration of mankind.

“Undaunted by failure after failure, through twelve long years of hope deferred did she persevere with a singleness of purpose and a sincere devotion which are truly unparalleled; and now that her own last expedition of the *Fox*, under the gallant M'Clintock, has realized the great facts that her husband had traversed wide seas unknown to all former navigators, and died in discovering a North-West Passage, then surely the adjudication to her of this Medal will be hailed by the nation, as well as by this Society, as one of the many recompenses to which the widow of the illustrious Franklin is eminently entitled.

“Lady Franklin's gratitude for this the highest testimonial we can offer, is thus feelingly expressed in a letter to myself, the only drawback to my reading of which is that she dwells too much on my poor though zealous services.

““5, Park Place, St. James's,  
May 24th, 1860.

“MY DEAR SIR RODERICK,

“As you were the first to communicate the great honour which has been conferred upon me by the Council of the Royal Geographical Society, and as I know you were the first to make the suggestion which was kindly and unanimously accepted by the Council, I am sure you will do me the farther favour of returning my heartfelt thanks to them.

“To no one could I make this request more fitly, as it seems to me, and with more confidence, than to the faithful friend of my dear husband and myself, who, during many long years, has made the cause of the lost crews of the *Erebus* and *Terror* his own, and to whose untiring and enlightened energy, exerted in behalf of our latest, and, as it were, dying effort, the little expedition of the *Fox* has been so conspicuously indebted.

“In giving expression to my natural feelings on receiving this precious Medal, you will feel assured that its chief value to me is the recognition by the most competent authorities, which it testifies to, of the life-long services of my husband in the cause of geographical research, and especially of the crowning discovery of the North-West Passage by himself and his companions, which cost them their lives.

“In the contemplation of so just and so generous an act towards the dead, all personal considerations are well-nigh absorbed, yet not so entirely but that I feel deeply the great and exceptional kindness of which I have myself become the object. Disclaiming, as I must ever do, all merit for efforts which originated in the natural impulses of love and duty, and which never could have been successful without the steadfast help of all those who upheld and served me so well, I shall not the less cherish, with great pride as well as gratitude, the touching and distinguished proof so generously accorded to me of the approbation and sympathy of the Royal Geographical Society.

“Believe me, dear Sir Roderick, sincerely and gratefully yours,

“JANE FRANKLIN.”

“Sir Roderick Murchison, Vice-President of the Royal Geographical Society, &c.”

“Breathing as this letter does the fulness of a grateful woman’s heart, yet does it not give full vent to all those feelings by which Lady Franklin is animated. She has, indeed, enjoined me to say that the honour conferred upon her is vastly enhanced by knowing that she only shares in that approbation of the Geographical Society which has been and is so warmly bestowed upon Captain Sir Leopold M’Clintock and his gallant associates.

“A still more deeply-seated sentiment, however (as yet ungratified), is implanted in the breast of the widow of Franklin—a sentiment which was no sooner broached in the House of Commons by Sir Francis Baring than it met with general applause, and elicited the commendation of the Prime Minister and of eloquent speakers on both sides—namely, that setting aside all pecuniary reimbursement for that large expenditure of money which she could ill afford, she hopes that the Parliament will be thus far generous as to reward the officers and crew of the *Fox*, and provide for the erection of a monument to the memory of her husband and his companions in a public place, on which shall be recorded that they died in being the first to discover a North-West Passage.

“Let then our gift of the Gold Medal, solemnly and unanimously conferred by us on Lady Franklin for her devotion in her husband’s cause, be followed up both by a suitable grant to the brave officers and crew of the *Fox* and by raising a monument to Franklin in Trafalgar Square, so that his earliest services under the immortal Nelson may be blended with the nation’s recognition of his Arctic fame.

"To the honour of France, her lost and lamented navigator La Perouse has his monument and trophies in the Louvre. Let England, then, also evince her gratitude to Franklin and his companions by a durable public memorial in bronze, and thus show that she not less truly honours those who die in so nobly serving their country."

The President, in presenting the Patron's Medal to Captain Sir F. L. M'Clintock, said :—

"It affords me sincere gratification to be the medium of conveying to you, Captain M'Clintock, this, one of the two highest rewards the Geographical Society can confer ; and in recognising the great services you have performed, I may be permitted to say that the value of those services to the cause of geographical science is appreciated throughout the civilised world."

Sir F. L. M'Clintock replied—

"I assure you, my Lord, it is with deeply grateful feelings that I receive this proof of the estimation which the Royal Geographical Society places upon my humble services. You are aware that the discoveries which have gained for me this honourable distinction were made incidentally, while following up anxiously a widely different purpose ; and I regard it as an additional proof of the liberality of the Council that they have, notwithstanding this circumstance, conferred upon me this valuable token of their approval. I am sure you will believe me when I say that its value is in my mind largely enhanced by the fact of its being conferred in conjunction with a marked and feeling tribute paid to the memory of our great Arctic discoverer. This circumstance—the recognition of the last services of the lamented Franklin and his devoted companions, is a richer reward to me than any I could personally receive. Let me thank you, too, on behalf of my gallant and devoted companions, to whose assistance I was so largely indebted, and who will see in this honour which you have conferred upon me not only a reward for my humble efforts, but a pleasing acknowledgment of their services. It has not been my fate to be employed directly and exclusively on geographical discoveries, but I trust that this ample recompense for past will be an incentive to future exertions in the same course. We live in times of great change, and it is impossible for any one, especially in my profession, to say what may be his future destination ; but it will afford me great pleasure if the offer of my services should be accepted hereafter to explore new regions, and extend the boundaries of our knowledge of the Arctic Seas."

A D D R E S S  
TO THE  
ROYAL GEOGRAPHICAL SOCIETY<sup>a</sup>  
OF LONDON;

*Delivered at the Anniversary Meeting on the 28th May, 1860,*

BY THE EARL DE GREY AND RIPON,  
PRESIDENT.

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OBITUARY.

IN accordance with our usual custom, I proceed to mention the losses by death which the Society has sustained since the last Anniversary.

Colonel George BAKER was one of the earliest associates of our Society, having been connected with it since the year 1830; and although, owing to the distance of his residence from London, he was seldom enabled to share in our proceedings, there was a period in his earlier life when he distinguished himself by undertaking and carrying through, under many difficulties, a geographical work of no trifling importance at the time, and of which the value was highly appreciated, while it has never since been impugned.

As an officer of the 16th Light Dragoons, to which regiment he had been from his youth attached, he bore his part, under the Duke of Wellington, in the first operations of the Peninsular war; and although prevented from sharing in the triumphant conclusion of them by falling into the hands of the French during a cavalry skirmish after the battle of Salamanca, and being marched as a prisoner to Verdun, he joined his regiment again after the peace of 1814, was engaged at Waterloo, and accompanied the army afterwards to Paris.

Having subsequently devoted himself with much diligence to a cultivation of those branches of military study which were so efficiently encouraged and directed at that time by Sir Howard Douglas, in the College at Farnham, when it became necessary to define and map the boundary frontier between the empire of Turkey and the newly created kingdom of Greece, Colonel Baker was selected, in 1830, by the Earl of Aberdeen, who then held the seals of the Foreign Office, as the English Commissioner to whom the work was entrusted. Two other military officers were associated with him as the respective representatives of France and Russia, by whom, jointly with this country, the measure had been adopted; and a Greek and a Turkish officer were added afterwards to the Commission.

The obstacles which presented themselves to the first commencement of this operation, from the absence of any accurate geographical data on which it might with safety have been founded, and the obstructions afterwards interposed during the progress of it by the intrigues of the Turkish Government, requiring repeated remonstrances on the part of the Allied Commissioners, which were supported by our Minister at Constantinople—these were the difficulties that created a very serious delay before the work was finally completed. Nor was it until December, 1835, that the map was presented in its finished state to the Sultan.

It was based upon a trigonometrical survey of a narrow strip of country extending on each side of the boundary line, which, reaching from the Gulf of Arta at its western to that of Volo at its eastern extremity, included, with all its sinuosities, a distance of 137 miles; and it was defined by 95 landmarks, which, though mostly destroyed by the Turks in the winter of 1832, were restored in the following summer. The office devolved upon Colonel Baker of submitting to the Conference of the Allied Powers, during these protracted operations, a plan by which at length the objections raised by the Porte to the arrangement were overcome, and the measure was brought to a successful issue.

Colonel Baker maintained to the latest period of his valuable life, which closed at Bath in December, 1859, the same talent for military survey, and the same diligence in prosecuting it, which characterised him in his earlier career: for, having resided for a few weeks with his family during the last autumn at Torquay, he drew up an able report, accompanied with actual measurements, of the whole neighbouring coast, pointing out the weak and the strong points of

defence which it commands; and the report was transmitted to the Commissioners then recently appointed for inspecting the Defences of the Naval Arsenals and the Coasts of the country.

General Sir T. Makdougall BRISBANE, Bart., was the representative of a family of high antiquity and elevated position. After some preliminary education, partly at home and partly at the University of Edinburgh, young Brisbane was placed at an academy at Kensington, where he distinguished himself by his great proficiency, and showed the bent of his mind by attending the lectures of eminent professors, particularly on astronomy and mathematics. In 1789 an ensign's commission was procured for him, and in the following year he joined the 38th regiment, then stationed in Ireland, where he became acquainted with the Honourable Arthur Wellesley, who was then of similar rank; and the friendship thus commenced endured until the death of the Great Duke, more than sixty years after. In 1793 he proceeded to Flanders, and served through the campaigns of that and the following year, was wounded, and endured almost incredible hardships during the retreat of the British army. In a work entitled '*Reminiscences*' (privately printed shortly before his death, and which contains many curious anecdotes of the Duke of Wellington), he says, "This was the severest winter I have ever seen in Europe. The troops were literally frozen to the ground every morning, and in one of those severe nights *eight hundred men were frozen to death*. . . . The Rhine was covered with a layer of ice 6 feet deep." In the October of the next year he was ordered to the West Indies, where he served with distinguished bravery under Sir R. Abercromby, Sir John Moore, Sir Thomas Picton, and other generals, at the capture of St. Lucia, Trinidad, and other islands. In 1799 his friends purchased a Lieutenant-Colonelcy for him in the 69th regiment, for the purpose of bringing him from the tropics, as his health had suffered greatly there. He accordingly came to England, but only to find that, contrary to expectation, the 69th had just sailed for Jamaica, which, after a few months at Cheltenham to recruit, he went out to join.

Colonel Brisbane, now for the first time in command, soon showed his aptitude for the situation. He endeavoured to improve the position of the army generally, by representing to the Commander in Chief the unhealthy position of the barracks throughout the West Indies, as being placed on the *leeward* instead of the *windward* side of the islands; but no notice was taken of his well-

meant endeavours, though his views have since received ample confirmation from the valuable 'Returns of Sickness and Mortality in the Colonies,' drawn up by Colonel Tulloch. Returning home, he was quartered in various parts of England until 1804, when the 69th was ordered to India; and as his health would not allow him to proceed thither, after trying in vain to exchange into the Guards or the cavalry, he was obliged to retire for a time on half-pay.

In 1810 Colonel Brisbane was appointed Adjutant-General at Canterbury, but he longed to join his old acquaintance, the Duke of Wellington, and, in consequence of his urgent applications, in 1812 he was made Brigadier-General, and proceeded to the Peninsula. There he was posted to the third division, commanded by his friend Sir Thomas Picton, and with it he served until the close of the war. Then he was sent to America, where he succeeded in causing the war on the Canadian frontier to be carried on according to the usages of civilized nations (which had not been the case before), and next served in France in the army of occupation. He had arrived in England just too late to share in the glories of Waterloo, but he was sent with twelve regiments to reinforce his old commander, who, when he inspected them at Paris, exclaimed, "*If I had had these men at Waterloo, I should have wanted no Prussians.*"

With the return of the army from France, in 1818, the services of Sir Thomas in the field came to a close. In 1819 he married Anna Maria, the heiress of Sir Henry Hay Makdougall, of Makers-toun, Roxburghshire, Bart., by whom he had two sons and two daughters, who all preceded him to the grave. In 1821, after holding for a short time the command of the troops in the south of Ireland, he was appointed Governor of New South Wales, where he found a wide field for the exercise of his active and benevolent mind. He introduced the culture of the vine, sugar-cane, cotton, tea, and tobacco; he imported horses, and thus so improved the breed that the colony can now supply cavalry horses for India; he did much to procure for it trial by jury and representative institutions, which it now enjoys. He encouraged, and liberally supported from his own means, all religious and charitable institutions; in his treatment of the convicts he abolished harassing and vexatious punishments, which he felt only irritated instead of reforming; and he first granted tickets-of-leave to the well-conducted, which gave a supply of much-needed labourers to the free colonists, the result of which was that at the close of his government, in 1826, the quantity of land under cultivation had been more than doubled,



while the expense of the convict establishment had been most materially reduced. On his quitting the government addresses of the most flattering nature were presented to him from all classes, and they were well deserved.

Sir Thomas now returned for the last time to his native land, and lived for more than thirty years as useful and as honoured as the man of science, and a public benefactor, as he had before been in his military and administrative capacity. He from his youth had cherished an ardent love for science, and a narrow escape from shipwreck had led him to become a practical astronomer. This was on his first voyage to the West Indies, when the ignorant master of the transport wandered out of his course on to the coast of Africa, and when he found his ship among the breakers, lost all heart and cried out, "Lord have mercy upon us, for we are all gone!" Young Brisbane, who was but two-and-twenty, replied, "That's all very well, but let us do everything we can to save the ship;" and, taking the command, he worked with his own hands until the vessel was placed in safety. This incident made a deep impression on him. "Reflecting," he says, "that I might often in the course of my life and services be exposed to similar errors, I determined to make myself acquainted with navigation and nautical astronomy; and for this purpose I got the best books and instruments, and in time became so well acquainted with these sciences, that when I was returning home I was enabled to work the ship's way; and having since crossed the tropics eleven times and circumnavigated the globe, I have found the greatest possible advantage from my knowledge of lunar observations and calculations of the longitude." This was shown in his voyage home from New South Wales, when he predicted the time of making Cape Frio, in Brazil, to within a few minutes, to the confusion of the captain, who, until day-break enabled him to see the land, believed himself at least 500 miles distant.

In order to pursue his astronomical studies, Colonel Brisbane, while he was on half-pay in 1808, had erected an observatory on a knoll, near the mansion house of Brisbane; and this in after years became his place of daily resort, beside often spending the night there. Whilst governor of New South Wales, he established an Observatory at Paramatta, which has rendered such services to science that it has been aptly styled "the Greenwich of the Southern Hemisphere;" and soon after his return to Scotland he formed another observatory at Makerstoun, to which he eventually

added a magnetic station, the only one in that country; and he showed great liberality alike in providing instruments, and in remunerating observers and printing the results of their labours. The clocks in the magnetic observatory cost upwards of 1200 guineas. He likewise assisted with his counsel and his purse many other establishments, as the Observatories of Edinburgh, Glasgow, and the Cape of Good Hope; and one of the latest acts of his life was to found two gold medals for the reward of scientific merit;—one for the Royal Society of Edinburgh, the other for the Society of Arts. The first of these was adjudged at Aberdeen, in September, 1859, to his fellow-countryman and former fellow-soldier, Sir Roderick I. Murchison. Such devotion to science did not pass unregarded. The Universities of Oxford and Cambridge conferred their degree of D.C.L.; while he was in New South Wales he was elected a Fellow of many learned Societies; and on the death of Sir Walter Scott he was chosen to succeed him as President of the Royal Society of Edinburgh. The gold medal of the Astronomical Society was awarded to him in 1828, and the address of the President (now Sir John Herschel) did but justice to him in saying that “the first brilliant trait of Australian history marks the era of his government, and that his name will be identified with the future glories of that colony, in ages yet to come, as the founder of her science.”

In 1836 he was created a Baronet; in 1837 named Knight Grand Cross of the Bath; in 1841 he became General, and at the period of his decease his was the third name on the Army List.

He died in the house in which he was born, on the 28th of January last, at the age of eighty-seven, and he is succeeded in the baronetcy by his nephew, the son of the late Admiral Brisbane.

Sir Thomas was a man of commanding appearance, more than six feet high, and with a handsome, intellectual expression of countenance. His name was on the Army List for a period of sixty-seven years, in the course of which he had fought in fourteen general actions, and twenty-three other battles, and had assisted in eight sieges. He had a gold cross and clasp for Vittoria, and the silver Peninsular medal and clasp; and received the thanks of Parliament in 1813 for distinguished service. He had crossed the tropics twelve times, the equinoctial line twice, had circumnavigated the globe, and had been in North and South America, Australia, the north of Europe, and the Mediterranean.

The best résumé that can be given of his character and pursuits

will be found in the following letter from our late President, Admiral W. H. Smyth :—

“ . . . . . You wish to know my opinion as to the estimation in which I hold the merits of my admirable friend, General Sir Thomas M. Brisbane. My knowledge of the pursuits of this eminently distinguished officer is of many years' standing, and my personal acquaintance with him almost as long ; for, shortly after the peace of 1815, we met, British soldier and sailor—of all places in the world—in a French astronomical observatory ! And I can render testimony to the high regard paid by his late enemies to his scientific attainments.

“ From long intercourse I can have no hesitation in pronouncing that Sir Thomas was equally familiar with the theory and practice of astronomy ; and he not only worked himself, but was the cause of work in others. Nor should it be overlooked that intellectual zeal at that time was even more meritorious than of late, since it was necessarily exerted among the incessant and frequently distracting duties of actual warfare.

“ About the year 1820, when appointed to the high office of Governor of New South Wales, Sir Thomas resolved to improve our astronomical knowledge of the Southern Hemisphere. With this important object in view, previous to sailing for his destination, he made direct inquiries in various quarters as to how it could be executed to its fullest extent ; and I cannot but feel proud of having been consulted on that very interesting occasion.”

After detailing the establishment of the Paramatta Observatory, and its result—“ The Brisbane Catalogue of Southern Stars ”—the Admiral concludes :—

“ The well-known military career of Sir Thomas Brisbane is now matter of history ; but I may truly assert that there is not, either in the army or navy, an individual to whom ‘ *tam artibus quam armis* ’ can be more appropriately applied than to that excellent and honoured officer.”

Isambard Kingdom BRUNEL, Esq., one of the most eminent engineers of the day, was born at Portsmouth in 1806, while his father, the late Sir Mark I. Brunel, was engaged in erecting the Block-factory there. The principal works with which Mr. Brunel's name will in future ages be associated, are the Thames Tunnel, in conjunction with his father ; the *Great Western*, and the *Great Eastern Steam Ships*, both, at their respective periods, the largest vessels ever built : docks at various seaports ; the *Great Western Railway*, with

its various branches and continuations; the Hungerford Suspension Bridge; the Tuscan portion of the Sardinian Railway; and the Hospitals on the Dardanelles, erected during the late war with Russia.

The President of the Institute of Civil Engineers in his address remarks: "In his professional career, it appears to me that full justice has not been done to the memory of Mr. Brunel. I allude more especially to his exertions in accelerating the progress of Oceanic Steam Navigation. The *Great Western* was a brilliant example of the correctness of his conceptions in this point. It must be conceded, that he was the first clearly and practically to conceive the advantages to be derived from augmenting the size of steamers, with a view to increased speed and to the extension of their voyages. Looking back, therefore, to the period of the construction of the *Great Western* steamer, she must be admitted to have been an absolutely successful experiment, mechanically and commercially; and the names of Brunel as the engineer, of Patterson as the shipwright, and of Maudslay and Field as the constructors of the engines, can never be omitted from the records of Oceanic Steam Navigation. The next step was the *Great Britain*; and so far as regards the construction of the hull, the efficiency of that vessel, even to the present day, bears ample testimony to the skill of the design; whilst her having endured a whole winter's buffeting of the waves in Dundrum Bay, testifies to the strength of her construction, and to the powers of resistance of which iron vessels are susceptible. It must not be forgotten, that it was to this vessel that the screw-propeller was first applied; and it should be stated, that by Mr. Brunel's exertions in experimenting upon the *Archimedes*, the introduction of that mode of propulsion was greatly accelerated." He was very early distinguished for his powers of mental calculation, and not less so for his rapidity and accuracy as a draughtsman. His power in this respect was not confined to professional or mechanical drawings only. He displayed an artist-like feeling for and love of art, which in later days never deserted him. He was elected a Fellow of this Society in 1852, and showed his interest in it by a frequent attendance at our evening meetings.

In the death of the Hon. Mountstuart ELPHINSTONE the Society has lost one of its earliest and most distinguished Fellows. He was born in 1779, and repaired at an early age to India, in the civil employment of the East India Company; and gradually

rose to all the principal offices of the diplomatic service at a time when our conquests were at their highest progress under the brilliant administration of the Marquess Wellesley. His friend and fellow labourer, Sir John Malcolm, said of him at the close of his public career, some thirty years subsequently, on the night of a great gathering at Bombay to bid Mr. Elphinstone "God speed" back to his native land, that from the day he, Sir John, met him a stripling on the beach to that hour (and the interval comprised years most eventful in the history of British India), Mr. Elphinstone had performed a distinguished part in every great political event that had occurred. In 1801 he was appointed an Attaché to the Residency at Poonah, and on General Wellesley's visiting that court he asked the Resident "to give him young Elphinstone." This was declined at the time, but in consequence of illness compelling Sir John Malcolm to resign the office of interpreter in 1803, Elphinstone joined the staff of the Duke of Wellington, and fought by his side in the most remarkable of those Indian battles that taught him how to conquer Spain. In 1806, the then Governor-General, the Earl of Minto, selected Mr. Elphinstone for the important and difficult mission to Cabul, a country at that time almost unknown to us; and of that mission he published, six years after, an able and instructive narrative.\* The travels of our medallist Sir Alexander Burnes, and our national disasters in that country, having afterwards drawn the attention of the British public to those regions, a third edition of the work was called for thirty years after it was first published, acquiring for its author considerable literary reputation.

In 1810 Mr. Elphinstone returned to Poonah as Political Resident, and "there," says a recent writer, "for eight years he conducted the British relations with the faithless, subtle, intriguing ruler of the Mahrattas in a manner which, for able statesmanship, has never been surpassed." The principal part of the Peishwah's dominions having been annexed in 1819, he was eventually raised to the government of Bombay, where for seven years he discharged its duties with the utmost talent and skill. In this position the liberal and enlightened Bishop Heber saw him, and described him as "in every respect an extraordinary man, possessing great activity of body and mind, remarkable talent for and application to public business, a love of literature, and a degree of almost

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\* Account of the Kingdom of Cabul.

universal information, such as I have met with in no other man similarly situated; and manners and conversation of the most amiable and interesting character."

A statue by Chantrey, a portrait by Lawrence, a service of plate, and, above all, the establishment of an "Elphinstone College" and two "Elphinstone Professorships," are the enduring monuments of Mr. Elphinstone's government of Western India. On his return home, shattered in health and exhausted by official labours, he betook himself with ardour to the study of the classics of ancient and modern Europe, to be added to the store of his already ripe Oriental knowledge. In these studies, and in the preparation of his '*History of India*,' he passed the first fourteen years of his home residence. The research necessary for the *History of the Mogul rule in Hindustan* was enormous; and the style in which that elaborate work is written marks the accomplished scholar.

The last eighteen years of Mr. Elphinstone's life were spent in literary retirement. On the 20th of November, and in the 81st year of his age, the useful, blameless, and happy life of this eminent man was brought to a close by a stroke of apoplexy.

By the decease of William Richard HAMILTON, England has lost one of her best public servants, and a stedfast promoter of letters, art, and science; while this Society recognises in him one of its earliest adherents, long one of the Council, and who, after filling the offices of President and Vice-President, only retired from our Trusteeship a year before his death.

Born in 1777, Mr. Hamilton was educated at Harrow School and at the University of Cambridge, where he acquired that thorough classical knowledge which enabled him soon afterwards to prove of signal service to his country.

He began life in the diplomatic service as the attaché and private secretary of the late Lord Elgin, with whom he proceeded on an embassy to Constantinople in the year 1799. In 1801, being sent to Egypt (then rescued from French occupation by the British arms), Mr. Hamilton, in company with Colonel Hilgrove Turner, so ably negotiated the terms of peace as to procure the cession of many of those noble works of Egyptian art which now adorn the British Museum. Among these was the famous Trilingual Stone of Rosetta, which, from its comparatively small size, had been hid away in a French transport, from which Mr. Hamilton rescued it at the risk of his life, as the vessel was infected with the plague. In the subsequent year Lord

Elgin having obtained from the Porte the gift of the famous marbles of the Parthenon, Mr. Hamilton was conveying them to England when the ship was wrecked at Cerigo, and those treasures were submerged. But, thanks to the perseverance and zeal of our deceased Associate, these productions of the very finest period of Greek Art were extricated from the deep, and have long constituted the chief ornaments of our great National Museum.

Following up his leading bent, Mr. Hamilton became a Fellow of the Society of Antiquaries in 1804, and distinguished himself by various publications in the Transactions of that body, among which his memoir 'Remarks on the Ancient Fortresses of Greece' was the precursor of that valuable and more extensive publication which he issued in 1810, under the title of '*Ægyptiacæ*.'

His public career was in the mean time essentially bound up with the business of the Foreign Office. Acting as secretary of Lord Harrowby and précis writer to Lord Mulgrave, he became Under-Secretary of Foreign Affairs in 1809. In the stormy and eventful period of the next six years, including the Peninsular War, and the battle of Waterloo, Mr. Hamilton held the same important office, which he occupied even to the year 1822, when he was appointed Minister at Naples. At the peace of Paris, in 1815, when he accompanied Lord Castlereagh to the Continent, we find Mr. Hamilton again standing forward in his love of the Fine Arts, and serving as an agent of the British Government in procuring the restitution to Italy of those famous paintings and sculptures of which she had been deprived by the French conquests.

In the fine arts then, as in antiquarian research, Italy as well as our own country has been deeply indebted to two William Hamiltons—the one the celebrated contemporary of Nelson, the other our deceased Member, and both of them British Ministers at Naples. The last official appointment indeed held by Mr. Hamilton was that of Minister Plenipotentiary and Envoy Extraordinary to the King of Naples, in which position he truly enjoyed life, by studying the relics of classical art, and in cultivating the acquaintance of all the eminent Italians, including Canova.

Returning to England in 1825, and retiring from public life on his well-earned pension, Mr. Hamilton then gave himself up to the pursuits of literature and science, in promoting which he proved so eminently useful. As early indeed as 1813 he had become a Fellow of the Royal Society; and in 1830, when this Society was founded, he took an active part in its formation, and also acted

for many years as the Treasurer of the Royal Institution of Great Britain.

Those only who were intimately acquainted with Mr. Hamilton could form an adequate idea of his valuable intrinsic qualities. Void of all display, his knowledge on a vast variety of subjects was profound and accurate; and while he could control and manage details of every-day business, he found time for much literary, antiquarian, and geographical research. He was also during twenty years one of the most efficient and useful trustees of the British Museum, as all his associates have testified. In that great National Repository of art and natural science, he who had brought to it so many of the finest works of Egyptian and Greek sculpture might well look around him with a proud and pleasing retrospect. But although he had deservedly acquired the name of Grecian Hamilton, his preference for the finest productions of art never led him to form a too exclusive estimate of the value of his favourite researches. Though not a naturalist, he had the highest respect for those who cultivated natural history; and so equitable and fair was he in his judgments, that those trustees who represented that portion of the British Museum have uniformly rejoiced that Mr. Hamilton was associated with them; for in him they felt secure that they could depend upon a man whose votes were always regulated by the desire to promote not one only, but all the departments of our great National Repository.

Having adverted to the career of Mr. Hamilton as a public servant, and as a cultivator of letters and the fine arts, let us here specially record our thanks to him for his well-performed duties as a geographer. At the head of those duties we are bound gratefully to remember that in 1838, the first year of his Presidency, he set the example of reading from the chair an Anniversary Address, which practice, followed up by him in the succeeding year, and never since departed from, has been one of the efficient means of raising our Society to its present enviable position. We may well therefore revert to that which may be called our inaugural discourse; for although we had then been a Society for seven years, and had enjoyed the advantage of receiving Annual Reports from our able Secretaries, we still lacked that enlarged view of our general objects which was first eloquently put before us by Mr. Hamilton. After developing all the links which bind Geography to History and Statistics, as well as to the sciences of Astronomy, Geometry, Natural History, and Geology, and showing that such researches



are comparatively easy in civilized countries, Mr. Hamilton thus proceeds: "But the real geographer becomes at once an ardent traveller, indifferent whether he plunges into the burning heats of tropical deserts, plains, or swamps, launches his boat on the unknown stream, or endures the hardship of an Arctic climate, amidst perpetual snows or ice, or scales the almost inaccessible heights of the Chimborazo or the Himálaya. Buoyed up in his greatest difficulties by the consciousness that he is labouring for the good of his fellow-creatures, he feels delight in the reflection that he is upon ground untrodden by man, that every step he makes will serve to enlarge the sphere of human knowledge, and that he is laying up for himself a store of gratitude and fame."\*

These stirring words were followed up by such clear and precise analyses of all the prominent geographical researches of the year as to fix a high standard for the discourses of all future Presidents. When indeed those researches had reference to Archæology and Numismatics, or to any point of ancient history, then it was above all that Mr. Hamilton shone out as the most powerful comparative geographer, and then it was that we felt the true value of the application of his learning.

Let it also be said that our deceased member was equally fervid in his appreciation of geography in its newest phases. Whilst the "world known to Homer" and the ancients had charms for him which he thoroughly enjoyed, his capacious mind revelled in that spirit of modern discovery which he characterised as "the happy spell which changed the destiny of nations, and without which we should long have remained immersed in the darkness in which our ancestors groped their way in the pursuit of knowledge, and should have lived on upon the ill-digested remnants which the ancients had left us."

Although he preserved a clear and unruffled mind to the last, Mr. Hamilton retired a year before his decease (then in his eighty-second year) from the active duties of life, resigning in succession his offices as trustee of the British Museum and of our Body; it having been a dominant feature in his character never to take part in any occupation to which he could not thoroughly devote all his powers. One body only,—that club of lovers of the fine arts called the "Dilettanti,"—he continued to manage with efficiency to within a week of his decease.

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\* Journal of the Geographical Society, Vol. VIII., President's Address, p. xxxix.

If the varied merits of our former President have thus been glanced at, as they were exhibited in public through a long, active, and well-spent life, those who were admitted to his personal friendship learnt to admire in Mr. Hamilton many sterling social qualities, for no one of which was he more remarkable than in the admirable instruction which he gave to his children, who, including one of our Presidents, and other sons distinguished in the civil, military, and naval service of their country, together with an only accomplished daughter, are left to mourn his loss.

The late Lieutenant-Colonel William Martin LEAKE was born in London on the 14th January, 1777. He was the son of John Martin Leake, a commissioner for auditing the public accounts, and grandson of Stephen Martin Leake, Garter Principal King-at-Arms; the family name of Leake having been derived from Sir John Leake, the famous Admiral of Queen Anne's reign.

After preliminary instruction at the Royal Academy of Woolwich he obtained his commission in the Artillery in the year 1794, and commenced his professional career in the West Indies. In 1799 he entered the field of his subsequent labours on being appointed to a mission for the instruction of the Turks in the use and practice of artillery, and repaired to Constantinople for that purpose. Early in 1800 he quitted that capital for more active service, and it having been deemed advisable by the English Ambassador that the Grand Vizier, then engaged in the defence of the southern provinces of the Turkish empire against the French, should have the assistance and advice of competent English officers, General Koehler, Captain Leake, and others, were despatched to Jaffa. They traversed Asia Minor, and visited the island of Cyprus; but meeting there Sir Sidney Smith, who had just signed a treaty for the evacuation of Egypt by the French, their attendance on the Vizier was no longer considered essential, and they returned to Constantinople. That treaty not having been confirmed, Captain Leake again proceeded on his way, and ultimately joined the army of the Grand Vizier in Syria, where, in the winter of the same year, he took advantage of his position to visit the greater part of ancient Palestine and Judæa.

In 1801 he crossed the Desert, and entered Egypt with the Turkish army; and Alexandria having been surrendered, and the French withdrawn, he received the directions of Lord Hutchinson to accompany the late Mr. William Richard Hamilton (then *private* secretary to Lord Elgin) into Upper Egypt, for the purpose of

making a general survey of that country, as well in regard to its military and geographical, as to its political and commercial state. The results of these labours were a map of the course of the Nile, from the Cataracts to the sea, a determination of most of the ancient sites, a description of all the monuments of antiquity contained in that space, together with a large collection of observations on the agricultural and commercial state of the country: an account of this journey was published by Mr. Hamilton in 1809.

In 1802 Captain Leake revisited Syria, and continued there the researches on which he had been employed in Egypt; and on his return home, having embarked on board the vessel in which Mr. Hamilton was conveying the Elgin Marbles to England, he was wrecked off the Island of Cerigo, and narrowly escaped with his life.

The acquaintance with Oriental politics and habits, which he had acquired during this service, was doubtless the cause of his subsequent selection for an important mission to the European provinces of Turkey. He received orders from His Majesty's Government to undertake a survey of the coasts and interior of that country, to examine its fortresses and means of defence, to point out their deficiencies to the native Governors and Chiefs, and advise for their improvement; and on that service he repaired in the year 1804.

From 1804 to the winter of 1806 he travelled considerably, in pursuance of his instructions, in Northern Greece and the Morea, and while he performed the important duties of his mission in a manner that gave entire satisfaction to the Home authorities, his peculiar tastes and talents for research received full development in a country where every day's journey produced an historical or topographical problem, which it taxed his erudition and critical acumen to solve; and where his thorough knowledge of ancient Greek enabled him to decipher obscure inscriptions, which led to the identification of many a ruined site.

The occurrence of hostilities, at the end of 1806, between England and the Porte prevented him from prosecuting his travels. He was detained as a prisoner at Salonica, whence, however, he escaped; and finding his way to Malta, he proceeded to England for the restoration of his health. Subsequently, he was again employed by His Majesty's Government in Greece till 1809; and it was on the observations made with so much keenness and perseverance during these years, from 1804 to 1809, extended by

subsequent reflection and study, that were formed those valuable and standard topographical works that appeared so many years later, which, by their well-weighed arguments and accurate observations, have justly caused their author to be termed a "*model geographer*," and from this period also may be dated that partiality for the modern Greek people, that indulgence for their weakness, and that hope for their future, which afterwards inspired many of his lesser writings, and coloured his conversation.

In 1814 Lieutenant-Colonel Leake was, as an English officer, appointed to attend upon the army of the Swiss Confederation, under the command of the Archduke John, and was for months at Berne, in that capacity, at the conclusion of the great European war.

On his return to England his literary labours commenced, and were continued with little intermission, and but little farther interruption from his more purely professional duties (for he retired from the army in the year 1823), until the day of his death.

In the year 1814 were published his '*Researches in Greece*,' in 1821 his first edition of the '*Topography of Athens*,' and in 1822 his edition of '*Burckhardt's Travels in Nubia, Syria, and Arabia*.' In 1824 he narrated the observations he made in Asia Minor 24 years previously. In 1826 issued the '*Historical Outline of the Greek Revolution*,' and in 1829 the '*Demi of Attica*.' In 1830 he published one of his greatest and most learned works, accompanied by a valuable map, his '*Travels in the Morea*,' which, in 1835, were succeeded by his '*Travels in Northern Greece*,' a work of equal research and more extensive proportions, with an accurate map on a considerable scale also; and, in 1841, appeared the 2nd edition of the '*Topography of Athens*.'

The latter years of his life were occupied in the production of the '*Numismata Hellenica*,' a most considerable and important work, containing an exact and faithful description of every coin in his extensive collection, enriched by critical and historical notes. This was published in 1854; and in 1859, but a few weeks before his death, a supplement on the same plan as the original work issued from the press, forming with that a mine of information for the collector, the antiquary, and the historical student, who in turn might find, as Colonel Leake himself had found, that the design on a coin could throw strong light upon many a question of ancient history or topography otherwise obscure or disputed.

Colonel Leake was a fellow of several learned Societies, both

English and foreign. He was admitted a member of the Society of Dilettanti in 1814; and on the death of Lord Northwick and Mr. Hamilton, in 1859, became second on the list, Lord Aberdeen only being above him. In 1828 he was elected a member of the Club, and at the time of his death was senior member of the Royal Society Club, except one. He was a fellow of the Royal and the Royal Geographical Societies, and an honorary member of the Asiatic, a vice-president of the Royal Society of Literature, an honorary member of the Royal Academy of Sciences at Berlin, and a correspondent of the Royal Institute of France.

In 1838 Colonel Leake married Elizabeth Wray, eldest daughter of the late Sir Charles Wilkins, and widow of William Marsden, both of whose names are honourably known to the Oriental literary world.

On the 6th January, 1860, Colonel Leake passed from us after a short and sudden illness; his intellect never weakened, his energies scarcely relaxed, notwithstanding the weight of 83 years. A very striking feature of his character was his modest and retiring nature; endearing him to all who knew him intimately, but disguising from others, less familiar with him, many of those eminent qualities of intellect and high scholarship which he possessed.

Colonel Leake was buried at the Kensal Green Cemetery. The Greek minister, at his own desire, followed him to the grave, expressing thereby the gratitude of his country to one who had spared no effort on behalf of the Greek nationality, and had done so much by his works towards elucidating the remarkable features of the land of Greece and the scenes of her glorious history. In him we have lost not only a scholar and an antiquary, but one other link (when so few survived) that connected us to the politics, the literature, and the society of the foregone generation.

LORD LONDESBOROUGH, the second surviving son of Henry, first Marquis Conyngham, by his marriage with Elizabeth, daughter of Mr. Joseph Denison, was born on the 21st of October, 1805. He was twice married: first, July 6, 1833, to the Honourable Henrietta Maria Forester, fourth daughter of the late Lord Forester, who died in April, 1841; and secondly, in 1847, to Miss Bridgeman, eldest daughter of Captain the Honourable Charles Orlando Bridgeman, which lady survives her husband. His Lordship leaves issue by both marriages. As Lord Albert Conyngham he served for a short period in the Royal Horse Guards, but then adopted the

diplomatic service. In May, 1824, he was appointed attaché to the British Legation at Berlin, and in the following year removed to Vienna, where he remained until February, 1828, when he was made Secretary of Legation at Florence. In July, 1829, he proceeded to Berlin in the same capacity, and continued in that employment till June, 1831. He sat in the House of Commons for some years previous to his elevation to the House of Lords, having represented Canterbury from 1835 to 1841; and again from March, 1847, to the early part of 1850, when he was raised to the peerage by the title of Baron Londesborough. In 1849 he assumed the name of "Denison," in lieu of that of Conyngham, in accordance with the will of his maternal uncle, Mr. William Joseph Denison, who bequeathed to him the bulk of his immense wealth. In politics Lord Londesborough was usually a supporter of Whig principles. He was created by George IV., in 1829, a Knight Commander of the Hanoverian Order, and was a Deputy-Lieutenant of the West Riding of York.

Lord Londesborough's taste for literature, science, and the fine arts, brought him into connexion with this and most of the learned Societies, and with their leading men. He availed himself of every opportunity to co-operate with and to give them encouragement and substantial support. No one was perhaps more identified with the progress of the study of our national antiquities. During his residence at Bourne Park, near Canterbury, he was enabled to make many successful researches in a branch of archæology heretofore but imperfectly understood, and his and Mr. Akerman's communications to the '*Archæologia*,' on the contents of the Saxon tumuli upon Breach Downs and in the neighbourhood, recorded a series of facts which have been often referred to, and which were rapidly augmented by fresh discoveries, made either at his Lordship's instigation, or in consequence of his example. In later times his Lordship instituted similar researches in Yorkshire with equal success.

When the British Archæological Association was formed, he (then Lord Albert Conyngham) accepted the office of President; and by his personal exertions and influence mainly contributed to the triumph of the new institution at its first congress at Canterbury.

The general collection of works of early and mediæval art at Grimston may be estimated by his '*Miscellanea Graphica*,' a

splendid work in folio, edited by Mr. Thomas Wright, and illustrated by Mr. Fairholt.

Towards the close of 1848 his Lordship visited Greece and Italy, and in the following year printed his tour, under the title of 'Wanderings in Search of Health:' a volume containing much information and well-told personal adventures.

Baron Peter MELVILL VAN CARNBÉE was born 20th May, 1816. He received his naval education at the late Royal Naval Institution at Medemblik. In 1835, when a midshipman, he made a voyage to the East Indies, and having returned to the Netherlands in 1838, was promoted to Second Lieutenant, and proceeded once more to the East Indies, where he remained until 1845, being engaged in the Surveying Office of East Indian Hydrography. He then came back from the East Indies to Holland in charge of the Overland Mail. In the year 1850 he sailed again for the East Indies, and was promoted to First Lieutenant, and elected Secretary of the East Indian Hydrographical Office. In October, 1856, he was promoted to Captain-Lieutenant, and died at Batavia in the fortieth year of his age.

Baron Melvill took little active part in surveying, but devoted himself to the study and compilation of the surveys of former and recent naval officers, and constructed from them charts and sailing directions. In this work his industry and intelligence were soon manifested, and the following are some of the more important works published by him :—

'Seaman's Guide Round Java,' which has been translated into the English language, and 'Le Moniteur des Indes,' by Melvill and Siebold, in 4 vols. The charts compiled by him are—'Passages between Sumatra and Borneo, with Riour, Singapore,' &c., 'The North Part of the said Chart with Anambas and Natuna Islands,' 'Chart of the Island of Java, and Passages Round Java,' in 5 sheets, 'Charts of the Strait of Macassar and of the Islands east of Java,' by Melvill and Smit. In addition to these he has constructed and published many small maps, the principal of which are, 'Carte Générale des Possessions Néerlandaises aux Indes Orientales, 1846,' 'Carte de l'île de Celebes, 1848,' 'Carte de l'île de Java, 1847,' 'Carte de l'île de Sumatra, 1848.' The latest work on which he was engaged, was the 'Algemeene Atlas van Neerland's Oost Indie.' His life was not spared to allow of his publishing more than 12 sheets, and the completion of this atlas will have to be effected by others.

He was a member of many Societies, and regret for the loss of this distinguished and amiable man is not confined to his personal friends, but is shared by naval men and Geographers, who must feel greatly indebted to him for the light he has thrown on the Hydrography of the East Indian Archipelago.

Captain William MOORSOM, R.N., C.B., entered the Royal Navy in 1830, passed his examination in 1835, and at the period of his promotion to the rank of Lieutenant in 1842, had been serving for some time in the East Indies as mate on board the *Endymion*. From that period up to his death he served with distinction in different stations, received post rank in 1851, and afterwards the Companionship of the Bath, as well as several foreign distinctions. He became a Fellow of this Society in 1853, and died in the early part of the present year.

The Venerable William Forbes RAYMOND, Archdeacon of Durham.—At Lincoln's Inn Mr. Raymond was appointed Warburtonian Lecturer, and also filled the post of Assistant-Precacher to Bishop Heber and to Bishop Maltby. He availed himself of this opportunity of applying, with great success, his learning and his skill in the Oriental languages to the illustration of Scripture. When Bishop Maltby resigned the position in 1835, he expressed his deep sense of the faithfulness and ability shown by Mr. Raymond in the office of his assistant.

The friendship and assistance of Mr. Raymond were of the greatest value and comfort to Bishop Maltby during the remainder of his Lordship's life, especially during his episcopal career in the dioceses of Chichester and Durham. As Examining Chaplain he gained the affection of the candidates for holy orders by his urbanity, and his kind and judicious advice. Whenever he found any who were anxious to pursue their theological studies in the midst of their parochial ministrations, he not only gave them the most friendly encouragement, but furnished them with such directions as might enable them to employ learning to real practical purposes. Sacred geography was one of his favourite subjects, and he pointed out to the young clergyman how deeply interesting such a subject might be rendered for expositions in the church, as well as for study in private.

After repeatedly refusing valuable preferment which Bishop Maltby offered him, he at last, in 1846, accepted the Archdeaconry of Northumberland, endowed with one of the reduced canonries in Dnrham Cathedral. To the great regret of the clergy he resigned the Archdeaconry in 1853. Indeed they were justly grieved at being deprived of the services of one who had gained their confidence and esteem by his sound judgment and ready attention in his official intercourse with them, as well as by his



gentleness of manner, and sympathy with them in their ministerial trials.

Archdeacon Raymond became a Fellow of this Society in 1852, and was a frequent attendant at our evening meetings.

Professor KARL RITTER was born at Quedlinburg in 1779, and at the age of five years was received gratuitously into Salzmann's educational establishment at Schnepfenthal, where he remained eleven years; whence he was removed to the University of Halle, and, remaining there for two years, then went to Frankfort. Here he met with men eminent in science, among whom were Humboldt, Buch, and Sömmering the physician. Ritter's first literary essays were published in the '*Kinderfreund*,' from 1803 to 1806. In the latter year he published six maps of Europe, and in 1811 a '*Geography of Europe*,' in 2 volumes.

In 1814 Ritter proceeded to the University of Göttingen, where he prepared the plan for his great work on Comparative Geography, a work which will long remain a record of the perseverance of the author. The first volume of this work was brought out in 1817, and the second volume, concluding Asia, in 1820. The year previously Ritter had been appointed Professor of History at the Frankfort Gymnasium, but soon after proceeded to Berlin, where he was made Professor of Geography at the Military Academy and the University. At first his lectures were sparingly attended. The Professor's fame, however, soon spread, and the largest lecture-hall could barely accommodate the numbers desirous of hearing them. The lectures most crowded were those on General Geography, on Palestine, on Greece, and on Italy. His professional duties left Ritter but little leisure to bestow upon the second edition of his '*Geography*;' nevertheless, from 1822, the date of the appearance of the first volume, to within a short time of his death, he carried the work to the 19th volume of Asia. I perfectly agree with the learned Mr. Norris, that "the labours of Karl Ritter are characterized by great industry, and an anxious desire to gather up, and systematically to arrange, every fact relating to the regions treated of in his work, and to leave no source unexplored from which any information was to be derived. His great work comprises not only the geography of each country strictly considered, but also the history, antiquities, politics, ethnology, natural history, and an account of any travels through them which may tend to throw light upon their condition." During his

last visit to England, he was a frequent attendant at the rooms of this Society. Ritter was one of the founders of the Geographical Society of Berlin, and an Honorary Member and Medallist of this Society, to which he also contributed his works. Dr. Kiepert has been elected to the Professorship vacant by the death of the lamented Karl Ritter.

Dr. John SIMPSON, M.D., R.N.—Dr. Simpson accompanied Captain Moore in the *Plover* to Bering Strait in search of Sir John Franklin and his companions in 1848, and after passing three winters in that locality, returned with Captain Moore and the other officers, viâ San Francisco, to England. He immediately volunteered to go back, by the same route, with Captain Maguire, who was appointed to succeed to the command of the *Plover*. He again passed three winters in the ice, two of which were at Point Barrow. He was greatly beloved by every one on board, and was so successful in his treatment of the crew that not a single life was lost. He made himself acquainted with the Esquimaux language, and wrote the best—indeed it may be said the only—account of the Western Esquimaux, and which will be found at page 917 in the Arctic Blue Books for 1855, and in the pages of the ‘Nautical Magazine,’ and will ever be considered a most valuable acquisition to our ethnographical knowledge of that part of the globe. On his arrival in England he was ordered to Malta Hospital, and rendered good service there during the Crimean war. He was afterwards promoted to Haslar Hospital, where his brief, but most useful and honourable career in the service terminated. Dr. Simpson was elected a Fellow in 1855, and took a warm interest in the Society. He was a highly talented man, well versed in his profession, utterly regardless of self, and devoted the best energies of his mind in advancing the happiness of others; in a word, he was a true Christian, well deserving of imitation in his singleness of purpose.

Robert STEPHENSON, one of our most eminent engineers, and M.P. for Whitby, was born at Willington in 1803, under very humble circumstances. On leaving school, at the age of fifteen, Robert Stephenson was apprenticed to Mr. Nicholas Wood at Killingworth, to learn the business of the colliery, where he served for three years, and became familiar with all the departments of underground-work. He was afterwards sent, in the year 1820, to the Edinburgh University, where Hope was lecturing on Chemistry, Sir John Leslie on Natural Philosophy, and Jameson on Natural

History. Stephenson remained in the University six months only, but is said to have acquired in that brief period as much knowledge as is usually done in a three years' course. It cost his father 80*l.*, but the money was not grudged when the son returned, bringing with him the prize for mathematics, gained at the University.

In 1822 Robert Stephenson was apprenticed to his father; but his health giving way after a couple of years' exertion he accepted a commission to examine the gold and silver mines of South America. The change of air and scene contributed to the restoration of his health; and after having founded the Silver Mining Company of Columbia he returned to England to assist his father in the arrangements of the Liverpool and Manchester Railway, by placing himself at the head of the factory at Newcastle. He obtained the prize of 500*l.* offered by the directors of that company for the best locomotive engine; and, about the same period, designed for the United States an engine specially adapted to the curves of American railways; and to him we are indebted for the type of the locomotives used in both hemispheres. The next great work upon which Stephenson was engaged was the survey and construction of the London and Birmingham Railway, which he undertook in 1833. He had already been employed in the execution of a branch from the Liverpool and Manchester Railway, and in the construction of the Leicester and Swannington line, so that he brought to his new undertaking considerable experience. His evidence before Parliamentary committees was grasped at, and it may be said that, in conjunction with his father, he has directed the execution of more than a third of the lines in the country. They were both consulted as to the Belgian system of railways, and obtained the Cross of the Legion of Honour in 1844. For similar services performed in Norway, which he visited in 1846, Robert Stephenson received the Grand Cross of St. Olaf. So also he assisted either in actually making or in laying out the systems of lines in Switzerland, in Germany, in Denmark, in Tuscany, in Canada, in Egypt, and in India. As the champion of locomotive in opposition to stationary engines, he resisted to the uttermost the atmospheric railway system, which had at one time considerable repute. The bridges he erected include that at Newcastle, constructed of wood and iron; the Victoria Bridge at Berwick, built of stone and brick; the bridge in wrought and cast iron across the Nile; the Conway and the Britannia Bridges over the Menai

Straits; and the Victoria Bridge over the St. Lawrence. Speaking of Stephenson in his address to the Institute of Civil Engineers the President remarks: "One of the distinguishing characteristics of his professional career was, that however bold he was in the conception of an idea, as for instance the Britannia Tubular Bridge, yet no one with whom I ever came in contact, watched with more anxiety the completion of these enterprises than did Mr. Stephenson. His mind was ever occupied in anticipating how, and in what shape, failures might arise. Another distinguishing feature in our late friend's career was his treatment of all those who were associated with him in his undertakings; his habit, with those who enjoyed his confidence, was to leave with them the utmost amount of responsibility which he could possibly lay upon them, and never to interfere, except in cases of emergency, or where his moral influence was required to prevent undue interference from superior authorities. The consequence has been, that over the whole face of the globe there are men of his school who have risen to competency and to eminence, and who live to extol and respect the memory of their revered chief."

He took great interest in all scientific investigations, particularly in the pursuits of this Society, being himself a great traveller and a valued Member of the Council at the period of his death. As a specimen of his liberality in the cause of science, it may be mentioned that he placed his yacht, the *Titanic*, at the disposal of Professor Piazzzi Smyth (the son of our former excellent President, Admiral W. H. Smyth), who was sent out with very limited means to Teneriffe, to make sundry scientific observations, and thus materially assisted the researches of that gentleman. In the same spirit he came forward in 1855, and paid off a debt amounting to 3,100*l.*, which the Newcastle Literary and Philosophical Society had incurred, his motive being, to use his own phrase, gratitude for the benefits which he himself had received from it in early life, and a hope that other young men might find it equally useful.

At the Leeds Meeting of the British Association of Science, he proposed a yacht trip to Iceland, to be accompanied by Dr. Shaw and others; but his health had been delicate for about two years, and he complained of failing strength just before his last journey to Norway. If his loss be severely felt in his profession, it is still more poignantly so in his large circle of friends and acquaintances. His benevolence was unbounded. His own pupils are

said to have regarded him with a sort of worship, and the number of men belonging to the Stephenson school who have taken high rank in their peculiar walk shows how successful he was in his system of training, and how strong was the force of his example. The feelings of his friends and associates were not less warm. He has passed away, if not very full of years, yet very full of honours.

Sir George Thomas STAUNTON, Bart., D.C.L., was the only child of the late Sir George Leonard Staunton, who is well known to the public as having accompanied Lord Macartney as Secretary of the first embassy to China, in the year 1792, and as the author of the account of the Embassy which was published afterwards. He is not less well known to those who are acquainted with the history of British India as having, when Lord Macartney was Governor of Madras, concluded the peace with Tippoo Sultan in the year 1782.

Sir George was born in May 1781, and died, after a succession of paralytic seizures, in the summer of the last year. He succeeded his father in the baronetcy in the year 1801. After his father's death he was the last male representative of a very ancient English family, the branch of it from which he was descended having been established as landed proprietors in the county of Galway since the middle of the 17th century.

In the year 1792 he accompanied his father to China, under the nominal designation of page to the Ambassador. For some time before the embassy embarked, and during the voyage to China, he had the opportunity of studying the Chinese language under two native Chinese missionaries from the Propaganda College at Naples; and he soon made such proficiency in acquiring a knowledge of it, as to be able to speak it with tolerable fluency, and to copy papers written in the Chinese character. In this manner he became a very useful appendage to the embassy. When the embassy was presented at the Chinese Court, the Emperor inquired for the little boy who could speak Chinese, conversed with him for some time, and good-naturedly presented him with an embroidered yellow silk purse for holding areka-nuts from his own girdle.

On leaving China, Sir George L. Staunton engaged a Chinese servant to accompany him to England, in order that his son, by constantly communicating with him in Chinese, might keep up and extend his knowledge of the language.

In the year 1799, having received the appointment of Writer in the factory of the East India Company at Canton, young Staunton

proceeded a second time to China. He remained at Canton, with some occasional visits to Europe, until the year 1817, having for some time before his final return to England filled the office of chief of the factory. His residence in China afforded him the opportunity of still farther advancing himself in a knowledge of the Chinese language by means of native teachers. He was the first member of the factory that had ever studied the language of the country in which their duties required them to reside; and thus he became very useful by superseding the necessity of employing native interpreters, in whom (principally from the fear which they had of the local authorities) much confidence could not be placed. While residing in China he made several translations from the Chinese, the principal one of these, and that a work of great importance, being the 'Ta Tsing-leu-lee,' or Chinese penal code. This last was published in the year 1810. Other translations of much interest, though of inferior importance to this, have been published since.

In the year 1816 a second embassy was sent to China, the late Lord Amherst, Sir Henry Ellis, and Sir George Staunton being appointed joint Commissioners of Embassy. An account of the proceedings of this embassy has been published by Sir Henry Ellis. Sir George Staunton, however, printed his private journal, and distributed copies of it among his friends.

After his return to England, Sir George Staunton purchased a house and landed property in Hampshire, where he afterwards resided during a part of every year. For some time he had the honour of representing South Hants in Parliament. He afterwards represented Portsmouth, and continued to do so until he resigned the charge a few years before he died.

After being finally re-established in England, he occupied himself but little with any of the pursuits of his early life; though it may be that his knowledge of botany had partly led him to the laying out of an extensive garden, with numerous hothouses and conservatories full of the rarest trees and plants.

Although his life was prolonged until he had entered on his 79th year, he was always of a delicate frame, and not capable of great physical exertion. Others observed in him a peculiar shyness and awkwardness of manner, of which his education affords an adequate explanation. But with this he on various occasions displayed great moral courage and determination. Many instances of this might be quoted, but one will be sufficient. On the occasion of the last embassy the Chinese Court refused to receive it unless the

ambassadors performed the ceremony of the *ku-tu* before the Emperor. Lord Amherst and Sir H. Ellis wished that they should do so, but Sir George was so satisfied that it would be regarded by the Chinese as an act of humiliation, and something like the homage paid to a feudal lord, that he positively refused his consent. The Chinese were aware of this, and threatened to dismiss the rest of the embassy, but to detain him as a prisoner. But he declared that this made no alteration in his view of the subject; that being convinced that he was right, he was quite ready to take his chance of whatever might befall him rather than swerve from what he regarded as the strict line of his duty.

Sir George was elected a Fellow of this Society in 1830, and remained one of its Trustees until his death.

Commander Charles TINDAL, R.N., entered the Royal Navy in 1800, and was employed for two years in the Mediterranean and Channel, and during the four following years served on the home station. He received his promotion as lieutenant in 1806, and was subsequently appointed to several ships; and in 1809, in the *Narcissus*, assisted at the reduction of the various islands in the West Indies; and contributed during a cruise in the Channel, in 1810, to the capture of the privateers *Duguay Trouin* and *Aimable Joséphine*, carrying between them 28 guns and 180 men. During the ensuing summer he was employed in active co-operation with the patriots on the north coast of Spain. He also made a voyage to Newfoundland, and in 1814, being then on the coast of North America, in the *Niemen*, took command of the boats of that ship, and in a very gallant manner cut out from Little Egg Harbour the letter-of-marque schooners *Quiz*, pierced for 14 guns; *Clara* and *Model*, each pierced for 12 guns. He retired with the rank of Commander, subsequently took the management of the Branch Bank of England at Birmingham, and afterwards that in Burlington Gardens. He became a Fellow of this Society in 1834.

Rear-Admiral Henry Dundas TROTTER entered the Royal Navy in 1815, sailed in 1818 in the *Eden* for the East Indies, and in 1819 accompanied the expedition under Sir Francis Collier against Ras-al-Khyma, the head-quarters and principal resort of the pirates of the Persian Gulf. Continuing on that station until 1823, and serving in several ships, he returned in the early part of that year to England, and was promoted to the rank of lieutenant. He next served for some years in the West Indies, and was made commander in 1826. He was afterwards employed on the West Coast of Africa,

and in 1841 took the command of the disastrous Niger Expedition. Having remained on half-pay for some years, he was appointed to the command of the Cape of Good Hope squadron, obtained his flag rank in 1857, and died suddenly last year.

Admiral Trotter joined this Society in 1839, and took the greatest interest in its proceedings; he was likewise a warm advocate for the suppression of the slave-trade.

The Rev. David WILLIAMS, D.C.L., Warden of New College, Oxford, died on the 22nd of March, at Oxford, in the 74th year of his age. Dr. Williams took his degree of B.C.L. in 1809, D.C.L. in 1824; was ordained deacon in 1809, and priest in 1810; was appointed second master of Winchester School in 1810, and held it up to 1823; in 1824 was appointed head-master, and held it up to 1835. He was appointed Canon of Winchester Cathedral in 1833, elected Warden of New College in 1840, appointed Select Preacher to the University in 1841, and Vice-Chancellor in 1856 to 1858, when he resigned the office in consequence of his declining health. The Rev. Dr. Williams joined this Society at its commencement, in 1830; and at the time of his decease he was Pro-Vice-Chancellor, a member of the Hebdomadal Council, and a Delegate of Estates.

Commander James WOOD, R.N., has been a useful contributor to our hydrographical knowledge of the globe. He began his career as a maritime surveyor at Fernando Po, under the late Admiral Fitzwilliam Owen, in the year 1827. He afterwards served in the *Hecla* in the Bight of Benin, and then went to the coast of California. He next joined the *Etna*, Captain Sir Edward Belcher, and assisted in his surveys on the African coast, on the Bar of Oporto, and on Skerki Bank off Tunis. He again returned to the coast of Africa in 1834 with Commander Skyring, and, after the death of that officer, he joined the *Raven*, and was employed in the survey of the west coast of Morocco and the Canary Isles. In 1836 Lieut. Wood served with Capt. Hewitt in the North Sea Survey, and in 1837 joined the survey of the coast of Wales and the south coast of England. From this station he was appointed to command the *Pandora*, accompanied Capt. Kellett in the *Herald* to continue the survey of the west coast of America, and took share in the examination of the coasts of Columbia, Guatemala, and California, as far as Vancouver Island. On the return of this expedition to England, Lieut. Wood was promoted to the rank of Commander; and in 1855 was given charge of the survey of the n.w. coast of Scotland, and some of his plans of the Isle of Skye have been exhibited before this Society.



The climate of the North of Scotland proved too severe for a constitution weakened by exposure for many years under a tropical sun; his health gave way, and he rapidly sank on the 12th April of the present year, at the early age of 47. In the Admiralty Charts of Africa, America, and the North-West Coast of Scotland he has left a name that will long be gratefully remembered by the mariner who has to navigate those coasts.

In addition to the above names, the Society has to regret the loss of the Earl de Grey, the Rev. Temple Frere, Arthur Baily, Joseph Bainbridge, George Frederick Dickson, George Reelard Griffith, W. H. Jones, and Charles Lewell, Esqrs.

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#### GEOGRAPHICAL PROGRESS.

In reviewing the progress of geography during the past year, I have adopted the practice of my predecessors, and commenced with an account of the Maritime Surveys of Great Britain; for which, as usual, we are indebted to our energetic associate, Captain J. Washington, the hydrographer to the Navy.

#### ADMIRALTY SURVEYS.

The Coast surveys in course of execution, under the orders of the Admiralty, both at home and abroad, have made steady progress during the past year. They are conducted, under the able direction of Captain Washington, by twenty different surveying parties, one-half of which are employed on the coasts of the United Kingdom, the remainder in the colonies of Australia, Cape of Good Hope, West Indies, Nova Scotia, St. Lawrence, and Vancouver Island; also on the coast of Syria, in the Turkish Archipelago, in Banka Strait, China, and Japan.

*England.*—On the east coast of England the work has been confined to inserting in the charts the few topographical changes that have occurred in the rivers Tyne, Humber, and in Yarmouth Roads, in the Orwell and Thames, and in Dover Road. In the Tyne the changes have been caused by the opening of docks, owing to the increase of traffic and to some most praiseworthy deepening of the river by dredging by the River Commissioners, by which 400,000 tons of soil, and consequently of obstruction, have been removed from the bed of the river during the past year: a work that cannot fail

to be beneficial; the piers, too, at Tynemouth have made some progress. In the Thames the Conservators of the river have done great good by deepening the shoals in Blackwall and Barking Reaches, thereby removing the obstacles that prevented vessels coming up into the Pool at all times of tide. Dover Bay has been carefully re-sounded by Mr. E. K. Calver, R.N., for the first time since the erection of the pier, which has now reached a length of 1200 feet from the shore, having its outer end in 7 fathoms at low water. The result of the sounding is that a slight scour of the bottom has taken place on the inshore portion of the bay and the soil deposited farther out,—a natural result of the eddy, caused by extending a pier nearly at right angles to the direction of the tide-stream. In other respects the change is inappreciable.

On the south coast, in the neighbourhood of Portsmouth, Southampton Water, and the Isle of Wight, Mr. J. Scott Taylor, R.N., has inserted in the charts the changes that have occurred during the last twelve years, or since Captain Sheringham's elaborate survey of that region in 1848.

In the Channel Islands Commander Sidney and Messrs. Richards and Taylor have corrected portions of Alderney and Guernsey and the outlying banks and dangers; they have also sounded the remarkable dyke in the bed of the Channel, about half-way between Portland and Alderney, known by the name of Hurd's Deep, and found it to extend considerably farther to the south-west than was before supposed. Its length within the 50-fathoms edge is 40 miles, its breadth  $1\frac{1}{2}$  miles, and its greatest depth 72 fathoms.

On the coast of Devon Commander Cox with Messrs. Usborne and Davis have completed 12 miles of open sea-coast, 32 miles of harbour coast-line, and sounded over an area of 60 square miles. Off the Land's End and in the Scilly Islands Captain Williams and Mr. Wells, R.N., have filled in the soundings over a space of 650 square miles, in the course of which they discovered some rocky ground, the spot of least depth 8 fathoms, lying 12 miles N. by E.  $\frac{1}{2}$  E. of Cape Cornwall, not before noticed. A chart of the Channel, in 3 sheets, on the scale of 0·15 of an inch to a mile, has been published at the Admiralty during the past year.

In the Bristol Channel Commander Alldridge, Messrs. Hall and William Quin have completed the surveys of the eastern half of Swansea Bay, including the Neath river and Port Talbot, in the course of which work they sounded over an area of 67 square

miles. In this vicinity a chart of the coast of Wales, from St. Ann's Head to St. Bride's Bay, including Broad Sound, a plan of the port of Bridgewater, and Barnstaple and Bideford Creeks, on the scales respectively of  $3\frac{1}{2}$ ,  $2\frac{1}{2}$ , and  $1\frac{1}{2}$  inches to a mile, all by Commander Alldridge and his staff, have been published at the Admiralty during the past year. Between the Bristol Channel and the Solway Firth Mr. E. K. Calver, R.N., with his assistants Messrs. Inskip and Davison, has revised the charts and prepared for publication the sailing directions of the West Coast. The plan of Holyhead Refuge Harbour, sounded by Mr. Calver last year, has recently been published at the Admiralty on the scale of 12 inches to the nautic mile.

*Scotland.*—In Argyleshire Commander Bedford, with his assistants, Commander Creyke and Mr. Bouchier, R.N., have completed the survey of Mull, including the soundings of Lochs na Keal, Scriedan, and Buy; also of Loch Etive on the Main, and about 20 miles of Linnhe Loch leading to the Caledonian Canal. In mentioning the names of these officers at the last Anniversary, it was accidentally omitted to be stated that, during the autumn of 1858, they, at the instance of the Refuge Harbours Commission, re-surveyed Peterhead and Fraserburgh Bays in a prompt and efficient manner, and their surveys have since been published at the Admiralty on the scale of 12 inches to the nautic mile. In Inverness-shire Commander Wood has accomplished 37 miles of the south coast of Skye, thus completing the survey of the island,\* and Mr. Jeffery has pushed forward his work in Lochs na Nuagh and Ailort, having mapped 41 miles of the coast.

In the Hebrides Captain Otter in the *Porcupine*, with her tender the *Seagull*, Lieutenant Chimmo, aided by his staff of Lieutenants Dent and Hawes and Messrs. Stanley and Grey, have examined several lochs, with a portion of the west side of the island of North Uist and the Monach Isles, and have sounded over a large area of the Little Minch.

In Harris Commander Thomas, with his assistants Messrs. Morrison and Sharban, have surveyed Loch Resort and a part of

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\* I regret to say that this was Commander Wood's last work. His long services on the West Coast of Africa with Admiral Fitzwilliam Owen, and on the north coast of America with Captain Kellett, told at length upon his constitution, and after a short illness he died on the 12th April, 1860. The mariner who frequents this stormy portion of the Coast of Scotland will have cause to remember with gratitude the name of James Wood.

Scarpa island, and the plan, on the scale of 6 inches to a mile, exhibited at one of our evening meetings, has justly elicited much approbation. This officer and Lieutenant Chimmo have very creditably continued their meteorological observations in the Hebrides, which are valuable from the paucity of such data connected with those regions hitherto available. Some charts of these coasts have been published by the Admiralty during the past year, as the north-west coast of the Isle of Mull, on the scale of  $1\frac{1}{2}$  inches, and Lochs Alsh and Duich, in Inverness-shire, on the scale of 3 inches to a mile; Loch Scriedan, too, is in the hands of the engraver.

*Ireland.*—On the east coast of Ireland Messrs. Hoskyn, Aird, and Yule have surveyed the dangerous coast between Strangford and Belfast Loughs, and a portion of the interior of Strangford Lough and Narrows. In Donegal, on the north-west coast, Captain Bedford and Lieutenant Horner have added some off-shore soundings to their charts and completed this portion of the coast. Off the south-west coast Commander Edye and Mr. McDougall have sounded the approaches to a distance of 30 miles off-shore, and determined the 100 fathoms-edge of soundings,—a valuable aid to a ship closing the coast of Ireland in a fog.

In the course of the past year several new charts of the coasts of Ireland have been published by the Admiralty, viz. from Ballyheige to Ballinskellig Bay, on the scale of  $\frac{1}{2}$  inch; Achill Head to Roonagh Head, scale  $1\frac{1}{2}$  inches, by Commanders Beechey and Edye; Roonagh Head to Dooaghtry Point, Ballynakill and Killary Bays, and Clifden and Mannin Bays, Inishboffin and adjacent coast of Galway, Sheephaven, Slyne Head and parts adjacent, Sligo and Ballysadare Bays, all on the scale of  $3\frac{1}{2}$  inches to a mile; also Donegal Bay and Sligo and Killala Bays, on the scale of  $1\frac{1}{4}$  inches; and all from the surveys of Captain Bedford and his assistants. They form an important contribution to hydrography.

*France.*—Fourteen sheets of the west and north coasts of France, from the Bidassoa to Ushant, and thence to Dunquerque, and seven sheets of the south coast from Palamos to San Remo, on the scale of  $\frac{1}{2}$  an inch, have also been published, as well as several special plans of harbours and roadsteads, all from that admirable work the ‘*Pilote Français*,’ which reflects high honour on M. Beautemps Beupré and all the Ingénieurs Hydrographes engaged on it.

*Spain.*—A new chart of the north coast of Spain, from the Bidas-

soa to Cape Finisterre, on the scale of  $\frac{1}{16}$ th of an inch, has just been published at the Admiralty, as also a Plan of the Port of Santander. It is hardly credible that an error of 11 miles in longitude, in some places near Bilbao, on this coast, has up to this time existed in all the maps of Spain published in this country. This part of Spain becomes of greater interest at this moment, as the immediate neighbourhood of Bilbao and Santander is one of the best positions to view the total eclipse of the sun of the 18th of July, and it is to these places, I am informed, the greater part of the English astronomers propose to go.

*Mediterranean.*—The Moro-Spanish war has led to the publication of a chart of the Strait of Gibraltar, from an excellent survey by the late M. Vincendon Dumoulin, on the scale of  $\frac{1}{70}$ ths of an inch. On it the correct features, with the lofty summits of Monte Picachos, rising 2430 feet, on the Spanish shore, and Apes' Hill, 2800 feet, on the African shore, and the comparatively shallow depths of that remarkable strait are for the first time truly represented, the greatest depth being 510 fathoms or 3060 feet. . Also a plan of Ceuta and the adjoining coast to Tetuan, on the scale of  $3\frac{1}{2}$  inches, on which is laid down the new boundary, as defined by the Treaty of the 26th of April, 1860, beginning at Khandak Rahmah, or the Ravine of Mercy, on the north, and circling round the eastern foot of Jebel Musa or Apes' Hill to the Wad Uyats on the south. The Moorish coast, with the territory of Riff, is likewise shown in a chart extending from Ceuta to the Zafarin Isles, on the scale of  $\frac{1}{4}$ th of an inch to a mile.

In the Turkish Archipelago Captain Spratt, Lieutenant Wilkinson, and the assistant-surveyors, in H. M. S. *Medina*, have brought to a close the survey of the Island of Candia or Crete, and we now have, for the first time, a correct representation of that beautiful island with its lofty central summit of Mount Ida—or, as now called, Psiloriti—towering to the height of 8060 feet; and we now learn the exact position of, and the degree of shelter which was afforded by the bay known in Scripture under the name of the Fair Havens, Kaloi Limnes of the Greeks, in which the vessel bearing the apostle St. Paul on his eventful voyage to Rome took refuge. You will be gratified to hear that the special approbation of the Lords Commissioners of the Admiralty has been conveyed to Captain Spratt, C.B., Commander Mansell, Lieutenants Wilkinson and Brooker, and Mr. Stokes, all of whom bore a part in this survey,

for the skill they have evinced in producing this fine specimen of topography.

On the coast of Syria Commander Mansell, in *H. M. S. Firefly*, with his assistants Lieutenant Brooker and Messrs. Skead and Millard, have completed the drawings of the Gulf of Iskanderûn, and made plans of Ayas, Latakiyah, and Beirût, all of which are in the hands of the engraver and the plans about to be published. While on the subject of Syria and Palestine, a country in which all must feel a special interest, I trust that I shall not be considered tedious if I say a few words as to the opportunity afforded by the nautical survey of the coasts now proceeding under the orders of the Admiralty for correcting the topography of the interior, for fixing the position of some of the most remarkable places, for measuring the heights of some of the principal mountains, and for the identification of places of Scripture interest.

How, too, is that admirable work the 'Dictionary of the Bible' (the first volume of which, ably edited by Dr. Smith, has recently appeared) to be completed, unless we, as geographers, contribute our share towards its perfection?

Many of our countrymen annually visit the Holy Land, and have a vague impression that there are numerous points of interest to clear up, but the very number appals them, and they do little or nothing. But if one or two special points were placed before them, according to the part of the coast they might start from, it is not improbable that they would fix their attention on those points and aid materially towards clearing away the difficulties that may attach to them.

The subject appears to divide itself into the following heads:—

1. The accurate determination of the position of important cities, mountains, &c.
2. The production of exact topographical plans of places of interest.
3. The identification of sites with Biblical history.
4. The examination of sites with reference to some special object, as the deciding between two conflicting traditions.
5. Points connected with the manners and customs of the natives which would elucidate Bible history.
6. Natural productions of any special parts of the Holy Land which would illustrate Biblical description.

7. Points connected with language, traces of ancient names, correct pronounciation of particular names, and, as far as possible, correct and uniform orthography.
8. Careful drawings of buildings and copies of inscriptions.
9. Traces of volcanic or other remarkable geological phenomena.
10. An examination and comparison of the tombs throughout Syria and Palestine.

A few examples may be cited in explanation of the above.

1. As to Geography :—

From Beirút chronometers and barometers might, without much difficulty, be carried to the Cedars, to the summit of Lebanon, to Ba'albek, and to Damascus, returning by Mount Hermon to the coast at Sidon and Beirút, where the error and rate of the chronometers could be again ascertained.

Another journey might be made from Akkah to Mount Carmel, Tiberias, Genesareth, Mount Tabor, Nazareth, returning by the plains of Esdraelon or Jezreel and Megiddo to Cæsarea on the coast.

Also from Yaffa to Shechem, Mount Gerizim, Samaria, Bethel, Jericho, Dead Sea, Jerusalem, Bethlehem, Hebron, and so to Gaza on the coast.

Seetzen, Burckhardt, Robinson, Lynch, Scott, Symonds, Porter, Van de Velde, Poole, Cyril Graham, Stanley, *etc.*, have done much for the geography of the Holy Land ; but no one knows better than these later travellers how much yet remains to be done before any approach to accuracy can be attained. Damascus floats east and west some 14 miles in longitude ; Gaza, although close to the coast, is half that amount, probably, in error in *latitude*.\*

The heights of cities and mountains are equally uncertain : Damascus and Jerusalem vary between 2200 and 2600 feet above the level of the Mediterranean ; Ba'albek between 3550 and 4160 feet ; Bethel from 1880 to 2400 feet ; Shechem from 1460 to 1860 feet ; the Mount of Olives from 2100 to 2700 feet ; and lastly, Mount Hermon from 7000 to 10,000 feet. Here is ample work for more than one travelling geographer.

2. Topographical plans of places of interest, as Shechem, Nazareth, Jericho, Bethlehem, Hebron, &c.

3. Identification of site, as Bethabara, the place of our Lord's

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\* Some notices of the travels of the energetic Professor Wallin of Finland, in the East, are given in former volumes of our Transactions.—Ed.

baptism, Mahanaim, Peniel, the forest of Ephraim, Pisgah, &c., in the mountains east of the Jordan.

The above instances suffice to show the character of the information sought.

If, then, those who take an interest in the Holy Land, and are willing to aid in the above proposal, will be so good as to transmit to the Hydrographer of the Admiralty the precise points which they consider require investigation (with a reference to the works in which the respective subjects have already been best discussed), I am authorised by him to state that the questions will be printed, sent to the surveyors on the coast, and circulated as widely as possible in the Levant, with the hope of obtaining useful answers.

*Deep-Sea Soundings.*—Before quitting the coasts of Europe, I must refer to the valuable line of deep-water soundings made by Commander Dayman in the summer of last year, from the entrance of the Channel across the Bay of Biscay, along the coasts of Spain and Portugal, and through the Strait of Gibraltar and the Mediterranean Sea to Malta. In crossing the Bay of Biscay on this line the descent from what may be termed the British Isles bank to deep water is very rapid, six times more so than off Valentia. Within 30 miles of the 100-fathoms' edge a depth of 1900 fathoms was obtained, and the greatest depth reached was 2625 fathoms. In the Strait of Gibraltar the soundings generally confirmed those obtained by the French survey of the Strait before alluded to, and the greatest depth was 510 fathoms; but a remarkable shoal spot of 45 fathoms was found about 8 miles N.N.W. of Cape Spartel in Marocco, nearly in a line joining that Cape with the coast of Spain at Cape Trafalgar—a feature in this part of the ocean, we believe, hitherto unknown. In the Mediterranean the depth in no part exceeded 1700 fathoms; and near Cape Bon, between Sardinia and Malta, deeper water was found than has yet appeared in any chart of that region. Physical geographers cannot but feel gratified that the requirements of submarine electric telegraphy conduce so much towards a better acquaintance with the bed of the ocean, of which we are still so ignorant.

Nor should I omit some notice of an expedition which is about to be despatched, to carry a line of deep-sea soundings from Scotland to the Farøe Isles, thence to Iceland, Greenland, and Labrador, with the hope of finding a route for the North Atlantic telegraph cable, where the relays shall not exceed 600 miles in length. The expedition will be commanded by our Medallist,



Captain Sir Leopold M'Clintock; while his companion in the late Arctic voyage, Captain Allen Young, with another Medallist, Dr. Rae, will follow in the *Fox* yacht to examine the coasts more in detail. As geographers, we must heartily bid them "God speed."

*South Africa.*—In the Cape Colony Mr. Francis Skead, R.N., Admiralty Surveyor, has corrected the general positions in False Bay and discovered two shoal spots lying about one mile to the south-west of the Cape. It is gratifying to be able to announce that on the first day of this present month of May, a bright light, revolving once a minute, at an elevation of 816 feet above the sea, and visible for a distance of 36 miles, has at length been exhibited on Cape Point. It seems extraordinary that this remarkable cape, so celebrated in the annals of navigation, first seen by the Portuguese navigator Bartolommeo Diaz in 1486, and first rounded by another equally famous Portuguese, Vasco de Gama, on the 20th of November, 1497, should for three centuries and a half have remained without a light to mark the turning-point in the high-road to India, China, and the East.

*Banka Strait.*—A new survey of this strait has been completed by Mr. Stanton, R.N., and his assistant Mr. Reed, in H.M.S. *Saracen*, in the course of which it has been discovered that a much better channel exists than has hitherto been in use. The chart of it has been immediately published, on the scale of a quarter of an inch to a mile, and is in general circulation. In the gulf of Siam six of the coast sheets on the same scale, resulting from the survey of Mr. Richards, R.N., have been published during the past year. Two sheets also of the west coast of Sumatra, on the scale of  $\frac{1}{16}$ th of an inch, with 20 plans of anchorages, from surveys by Dutch officers, have also been recently published at the Admiralty.

*China.*—The requirements of the war have led to the publication of a general chart of the coast of China, from Hongkong to the gulf of Pechili, on the scale of  $\frac{1}{16}$ ths of an inch to a degree. Three sheets also of the Si Kiang, or West river, on a scale of  $\frac{1}{16}$ ths of an inch to a mile, from a sketch survey by Lieut. Bullock, R.N., have been published, and also three corrected sheets of the Canton river, on a scale of 3 inches, and Wusung river, by Commander Ward and staff, on a scale of 3 inches to a mile. A map of the north-eastern provinces of China, from Chusan to the China Wall, on the scale of  $\frac{1}{16}$ ths of an inch, and another of the country between the gulf of Pechili and Peking, on the scale of  $\frac{1}{16}$ ths of an inch, have also been prepared from the best available documents by Mr. Edward J. Powell,

of the Hydrographic Office, and published by the Admiralty. In the event of a march by the allied forces on Tien-tsing or Peking, this latter map cannot fail to prove useful. We have received from our associate, Major W. S. Sherwill, Deputy Surveyor-General of India, a map of the China coast, from the Canton River to the Gulf of Pechili, with a rough outline of the provinces between Canton and Peking; several valuable remarks and statistical tables are engraved on the map, which was published, on a scale of 24 miles to an inch, at Calcutta, November, 1859.

*Tartary.*—Commander Ward and his staff, Messrs. Kerr, Blackney, Farmer, and Bedwell, in the *Actæon*, with Lieutenant Bullock and Mr. Ellis, in the *Dove* gunboat, have made good use of their time on the coasts of Tartary, Korea, and Japan. To the north we have a survey of the bay of St. Vladimir; in Manchuria, of Seau-wuhu bay, Observation spot, on the north-east side of the bay, being in lat.  $42^{\circ} 54' 14''$  N., long.  $133^{\circ} 50' 32''$  E.; in Korea Tsan-liang-hai harbour (the Chosan of Broughton in 1796), in which the north point of Deer Island is in lat.  $35^{\circ} 6' 6''$  N., long.  $129^{\circ} 1' 49''$  E.; and lastly, a survey of a magnificent sound, that divides the island of Tsu-sima into two parts. The above plans are on the scale of 3 inches to a mile, and they will be engraved and published on a suitable scale in the course of the present year, illustrated by some characteristic sketches in Korea and Tartary by Mr. Bedwell, R.N. These are positive acquisitions to the geography of little known coasts, such as it seldom falls to our lot to have to record, and they reflect great credit on the officers who, in spite of many difficulties, have persevered in accomplishing them.

*Australia.*—Captain Denham, in H.M.S. *Herald*, with his staff, composed of Lieutenant Hutchinson, Messrs. Smith and Wilds, masters, and Messrs. Hixson and Howard, second masters, have cleared away numerous reported dangers, and defined the limits of several reefs and banks in the Coral Sea during the past season. However important these new positions are, it is not necessary to enumerate them here, as besides having been published immediately on reaching the Admiralty, and being inserted in the Admiralty charts, the notice of them has been reprinted at Sydney, at the Cape of Good Hope, and in the United States, and thus within the space of three months from their discovery, the whole civilized world was furnished with the means of correcting their charts of this much frequented route, which connects Sydney with Torres Strait, India,

and China. The coasting charts, twelve in number, on various scales, published by the Trinity House, Adelaide, under the directions of B. Douglas, Esq., and accompanied by sailing directions, will be duly appreciated by mariners visiting those parts of Australia. In Tasmania, Mr. Smith, R.N., of H.M.S. *Herald*, has made a plan of Hobarton, on the scale of 6 inches to a mile, which will be immediately engraved and published. The map of Tasmania, in four sheets, scale  $\frac{1}{316,800}$ , or about 5 miles to an inch, by James Sprens, Esq., Surveyor-General, is coloured to distinguish the counties, gives soundings, and is apparently the largest and best map published.

*British Columbia.*—The surveying party, under our associate Captain George Richards, in H.M.S. *Plumper*, consisting of Messrs. Bull and Pender, masters, Lieutenant Mayne and Mr. Bedwell, second master, have, as usual, worked most industriously during the past season. They have surveyed Pitt and Frazer rivers, with the magnificent opening of Burrard Inlet, which carries water deep enough for a line-of-battle ship, up to within 3 miles, overland, to the site of the capital, New Westminster. Also parts of the east coast of Vancouver Island, with the adjacent channels, in the course of which they have examined 700 miles of coast, while Lieutenant Mayne has explored 500 miles of the Upper Frazer. They have sounded thoroughly over 420, and partially over 400 square miles, the greatest depth between Vancouver Island and the main being 230 fathoms. The coast line has been laid down on the scale of 3 inches, plans of harbours and Frazer and Pitt rivers on 6 inches, and Victoria harbour on 24 inches to a mile. Mr. Bedwell has contributed also some very characteristic sketches of scenery in these regions.

*Canada.*—In the St. Lawrence survey Commander Orlebar divided his staff of assistants into two parties; Commander Hancock, with Messrs. Desbrisay and Carey, having re-examined the river between Montreal and Quebec, and inserted all the changes consequent upon the improvements carried out by the Montreal Harbour Commissioners; while Commander Orlebar, with Mr. Clifton, returned to the coast of Labrador and the Strait of Belleisle, where several positions were redetermined, and numerous soundings taken. In the course of the survey 370 miles of coast were re-examined, and 1430 linear miles of soundings run. The charts of the Upper St. Lawrence, in twelve sheets, on the scale of 2 inches to a mile, are in the hands of the engraver, and will be published in July.

The sheets of the gulf and of the river below Quebec have all been revised and corrected in longitude according to the most recent determinations. The sailing directions by Rear-Admiral Bayfield also have been revised, and the third edition is just complete. In Cape Breton Island and Nova Scotia the following charts and plans have been recently published by the Admiralty:—Louisburg Harbour, on the scale of 4 inches; Nicomtau Bay, on 3 inches; Caraquette and Miscou, on  $1\frac{1}{2}$  inches; and Little Bras d'Or, &c., on  $\frac{1}{16}$ ths of an inch to a mile; and thus the squadron that is to accompany H.R.H. the Prince of Wales to visit Nova Scotia, New Brunswick, Prince Edward's Island, and Canada, will be furnished with the most recent charts and sailing directions that this country can produce.

*Bay of Fundy.*—Captain Shortland, with his staff, Lieutenant Scott and Messrs. Pike, Scarnell, Mourilyan, and Archdeacon, has been chiefly employed at the upper end of the Bay of Fundy, where they have examined 60 miles of open coast, and 120 miles of river and harbour shores, sounding over an area of 290 square miles. An important service has been performed by Captain Shortland in determining the limits of Le Have bank, which lies to the southwest of Cape Sable, and now that it is correctly laid down on the charts it will be useful in making the land in a fog, if vessels will only be induced to use their lead and carry a line of continuous soundings.

*West Indies and South America.*—A very creditable chart of the island of Grenada, on the scale of 2 inches to a mile, has been completed by Mr. Parsons, R.N., and his assistants, and they are now at work on the Grenadines, and proceeding to the northward to the isle of St. Vincent.

A fifth edition of the second volume of the South American Sailing Directions by our Medallist, Captain (now Rear-Admiral) Robert FitzRoy, thoroughly revised and much added to by Mr. Hull, R.N., has just been published at the Admiralty: it comprises the coast from the south point of the Rio de la Plata, through Magellan Strait and round Cape Horn to Valparaiso, Guayaquil, and Panama. A plan of Choiseul Sound and Bodie Inlet in the Falkland Isles, in the South Atlantic, on the scale of  $1\frac{1}{2}$  inches to a mile, has also been published during the past year.

*Variation.*—My predecessor in this chair, in his Address of last year, had occasion to notice with approbation the Variation Chart of the world compiled by Mr. Frederick J. Evans, R.N., of the

Compass Department of the Admiralty. This officer has since followed up the work by collecting the deviation tables of all iron ships in Her Majesty's service and the *Great Eastern*, whence he has been enabled to arrive very nearly at the laws which govern these anomalies in our compass-cards, and has prepared a valuable paper on the subject, which it is understood will soon appear in the *Philosophical Transactions*. Your late President in the same paragraph of his Address went on to urge the necessity of great caution in marking accurately on our charts the existing variation, and making allowance in shaping a course for its rapid change in some localities, pointing out that an error of a quarter of a point of the compass in a run of 500 miles would amount to 25 miles. Surely his words must have been prophetic! A few months had hardly elapsed before the iron screw steamer *Indian*, by neglecting this very caution in the short distance of 300 miles from Cape Race towards Capo Sable, ran upon the reefs upon the coast of Nova Scotia, at a spot full 40 miles out of her proper course, and became a total wreck. Let me again then urge on all engaged in the preparation of charts that they look most carefully to the variation of the compass and to its rapid change in certain localities.

Besides the surveys above enumerated as in progress in different parts of the world, the labours of the Hydrographic Office during the past year have consisted in the publication, under the immediate superintendence of Mr. Michael Walker, Chief Draughtsman, of about 80 new and corrected charts of various coasts and plans of harbours, some of which have been already mentioned. The number of Admiralty charts printed has been 148,000, of which 120,000 have been sold to the public. In addition to these have been published the usual annual lists of the 2000 lights spread all over the globe; Notices to mariners of new lights; hydrographic notices of new rocks and shoals discovered; Tide Tables for the British Isles; the time and height of high water for the principal ports in the world; and some 200 corrections in Raper's Tables of Maritime Positions, chiefly in Newfoundland, St. Lawrence, British Columbia, Manchuria, the Eastern Archipelago, and Australia.

#### TOPOGRAPHICAL DEPARTMENT OF THE WAR OFFICE.

Our Associate, Colonel Sir Henry James, R.E., has favoured me with an account of the department under his charge, which I have much pleasure in laying before the Society. It is divided into

two distinct branches, viz., the Ordnance Survey of the United Kingdom, and the Topographical and Statistical Dépôt of the War Office: previously to the year 1857 they were superintended by officers who were quite independent of each other, but since then they have been formed into one Topographical Department, and placed under Colonel Sir Henry James as Director.

*Ordnance Survey.*—A Report of the progress of the department during the year 1859 has been laid before Parliament, and from this Report we are able to state the exact progress which has been made in the Ordnance Survey up to the present time. And first, as regards the great trigonometrical operations of the survey, we learn that the principal triangulation and the principal lines of levelling in Ireland have been already published, and that the principal lines of levelling in Great Britain are in the press, and will be published this year, and complete this great branch of the work which commenced so long ago as the year 1784 under General Roy.

Along these principal lines, which are laid out as a network over the whole country, broad arrows, or the Queen's marks as they are sometimes called, have been cut upon the churches, bridges, and other permanent structures, as the exact points to be found on the ground to which the levels refer; and as the heights of these points are all given in reference to the level of mean-tide at Liverpool, they form accurate definite points of reference for those who are engaged in any great engineering operations, such as the laying out of railways, roads, canals, or the drainage of extensive districts, as well as points of reference for connecting the levelling taken within these lines in the execution of the Ordnance Survey.

It will be remembered by all who have taken any interest in the progress of the Ordnance Survey, that after the 1-inch map of England and Wales had advanced from the Land's-end to the borders of Yorkshire and Lancashire, the survey of Great Britain was suspended, that the survey of Ireland might be taken up on the scale of 6 inches to the mile; and that after all the plans of Ireland had been published on the 6-inch scale, the surveys of England and Scotland were resumed. After much discussion on the subject, and the appointment of a Royal Commission under Lord Wrottesley, it was definitely settled that the scale for the large plans of the cultivated districts should be the  $\frac{1}{25344}$ , or 25·344 inches to a mile; that the scale for the large uncultivated district

should be the 6-inch scale; and the plans on the 25·344-inch scale reduced to the 6-inch scale, to make the county plans uniform on one scale; and again reduced to the 1-inch scale to complete the 1-inch map of the United Kingdom.

The work of making these reductions, which was formerly a tedious and expensive operation, has been so simplified by the introduction of photography for the purpose, that the whole series of plans now produced do not cost more, if, indeed, quite so much, as the 6-inch plans of Ireland formerly did.

The Report then details the progress which has been made in the survey on these scales in England, Ireland, and Scotland; and we learn that as regards England, the six northern counties, viz., Yorkshire, Lancashire, Durham, Westmorland, Cumberland, and Northumberland, will be finished within this financial year. The plans of the last two counties are now in course of publication, and large parties of surveyors are employed in completing the survey of them; that of the 1-inch map of England and Wales will also be nearly finished this year.

That the 6-inch maps of Ireland have all been reduced to the 1-inch scale, and that they will all be engraved in outline in the present year, although some time must elapse before all the hill-features are sketched and engraved upon them. More than one-third of the hill features are, however, already sketched, and several sheets engraved with the hill features on them; and as the director of the survey will soon have the draftsmen engaged at present on the north part of England available for the completion of this work, we may confidently anticipate an early completion of the 1-inch map of Ireland also.

In Scotland we find that all the southern counties have been surveyed on the large scale, and that the survey is now proceeding in the counties of Perthshire and Forfarshire, and that a considerable portion of these counties has already been finished and published. The counties of Dumbarton, Stirling, and Clackmannan, were finished during the last year. With the exception of the narrow slip of cultivated country on the eastern coast of Scotland, the surveyors have now before them only the mountainous districts and the islands.

All the plans of the southern counties have been reduced to the 1-inch scale, and several of the sheets have already been published on this scale. Duplicate electrotype-plates have also been taken from some of the original copper-plates, and Sir Roderick

Murchison, Director of the Geological Survey, has published them, with the geological structure of the country represented on them. Captain Washington, R.N., Hydrographer to the Admiralty, is also supplied with the copies of the plans, and with distances and heights, to enable him to connect his hydrographical charts with the Ordnance Survey, and thus the topography, hydrography, and geology, have one uniform accurate basis.

• I have referred to the advantage to the survey which the introduction of photography by Sir H. James has produced; it has enabled him to do that which would otherwise have been impossible, that is the production of the series of maps required in any time which could be possibly allowed for the work. And in this last Report Sir H. James has given an account of a method now employed for the reduction and transfer of the maps to copper, zinc, or stone, which is not only applicable to the immediate purposes of the survey, but which will be found of inestimable advantage for the production and printing of fac-similes of any printed or manuscript document, or outline engraving. This discovery is so important, that I think it will gratify the Fellows of the Society if I give a concise account of it.

The fact that a solution of the bichromate of potash becomes insoluble under the action of light is the basis of the operation; and to render this available for the purpose of printing on zinc or stone a highly-intensified negative photograph is first taken with collodion on glass; a sheet of thin tracing paper is then coated with a saturated solution of the bichromate of potash mixed with gum-water; when dried, this paper is exposed in the printing-frame, under the negative, for two or three minutes in the light. The action of the light through the lines or writing makes that part of the composition insoluble, while the remainder remains soluble, and can be removed. To effect this the bichromate positive is laid on a sheet of zinc, previously charged with lithographic ink, and passed three or four times through a printing-press. On taking the paper from the plate the entire surface is uniformly covered with ink; but on submerging the paper in a shallow vessel of hot water with a little gum in it, and gently brushing over the surface with a flat camel-hair brush, all the soluble portion of the composition, with the ink attached to it, is removed, and the outline of the MS. or print is produced quite perfect, and charged with ink, and, when dried, it is at once ready for transfer to zinc or stone or the waxed surface of a copper plate. Sir H. James has called this art Photo-zinco-



graphy; and its value for the purpose of copying and printing at a trifling cost facsimiles of ancient MSS. and rare documents, now locked up and inaccessible to the public, must be obvious to every one.

A specimen of this art is given in the Report on the Survey; and we have seen several others, which leave no doubt either of the importance of the discovery or of the perfection to which the art has already been brought on the Ordnance Survey.

#### TOPOGRAPHICAL AND STATISTICAL DÉPÔT.

While the operations of the Ordnance Survey are confined to the production of the maps and plans of the United Kingdom, the Topographical Dépôt is designed for the collection of the most accurate maps of our colonies and every part of the world, with such statistical information as bears more immediately upon the military resources of every country.

Within the last year a catalogue has been printed of all the maps, plans of fortified places, and charts which have already been collected in the Dépôt; and the Secretary of State for War, impressed with the importance of making this collection as perfect as possible, has appropriated an additional portion of the grant for this year for the purchase of such maps and plans as are still wanting.

The work of the Ordnance Survey is conducted by the officers and men of four companies of the Royal Engineers and a great number of civil assistants; but for the work of the Topographical Dépôt Sir H. James has the assistance of one officer from each of the following services, viz. Artillery, Engineers, Infantry, and the Navy, the special acquirements of officers from these branches of the service being required for the effective conduct of this branch of the department.

The Report gives a full detail of the great amount of work which is executed in the Dépôt, and which includes the plans of colonies, battles, sieges, &c., as well as the vast number of circular letters and orders required by the War Department.

Among the maps is one of Europe, showing the boundaries of every state as arranged by treaties, with the dates of the several treaties; and on this map the position of every coal-field in Europe is shown, with returns of the produce and nature of the coal in each.

Plans of every barrack and fort in Her Majesty's dominions are

in course of publication, and two volumes have already been published.

Returns of the strength, organization, and equipment of every army in Europe have been compiled from the most authentic sources, and a great quantity of other work which it would be tedious to detail; but some idea may be formed of the extent of the work performed in the Topographical Department, from the fact that 190,000 plans were published during the last year.

The Topographical Department has constantly to furnish officers and men for the surveys of the colonies; and we observe from the Report that, during last year, Lieut. Bailey and a party of Royal Engineers have been sent to the Cape of Good Hope, and other parties to British Columbia, Belize, and Malta.

#### METEOROLOGICAL DEPARTMENT OF THE BOARD OF TRADE.

In the Meteorological Department of the Board of Trade (and Admiralty), under the guidance of our excellent Medallist, Admiral R. FitzRoy, much has been effected during the last two years by simultaneous observations at many places, in addition to the registration of atmospheric occurrences sedulously carried on at sea and on land in many parts of the world.

Practically, these extensive observations of facts, occurring in various climates and under a variety of conditions, from arctic or antarctic regions to those of the tropics, have directly tended to prove the uniformity of those laws by which our atmosphere is governed and the differences of climates determined.

Meteorology, which had been thought a complicated and vague subject, has approached the character of an exact science; and the tabulated labours of many observers in successive periods of years during the last two centuries have begun to bear fruit in their present usefulness to practical as well as to theoretical students of atmospheric phenomena.

It is now by no means difficult to estimate the climate of any place of which the geographical position is known.

The hours of highest and lowest temperature and barometric pressure, the normal height of the mercurial column, and the prevalence of moist air, rain, or dryness, much or little cloud, &c., can be predicated approximately for any part of the world, although in that particular place no observations may yet have been made.

More than this, however, and more directly valuable, is our confirmed knowledge of the "laws of storms," and our further

acquaintance with the nature and succession of the prevalent or various winds over the earth and ocean.

Consequent on the recorded observations of numerous contributors\* to meteorological science, we have now a general and, in some branches, a detailed acquaintance with the subject; we have good instruments and tables, and the use of them is better known.

Her Majesty's Government has endeavoured to diffuse practical knowledge of winds, weather, currents, storms, and climates, not only among mariners engaged in voyages to distant regions, but among the coasters and fishermen along our own shores.

Instruments and instructions have been liberally lent (at the public expense) to selected captains of ships; while other such aids, of a kind expressly suitable, have been similarly lent to more than thirty of the most exposed and least affluent fishing-villages.

The hardy populations of these places have already derived much benefit and have strongly expressed their sense of gratitude for the use of these barometers, thermometers, and plain instructions; while the registers returned from numerous ships among the finest of our merchantmen, besides men-of-war, now constitute a mine of valuable maritime and scientific information.

Among many results indirectly or immediately flowing from the recorded observations on board so many ships thus supplied by Government with reliable instruments, verified at the Kew Observatory, has been one which cannot be too widely known among voyagers,—namely, that near the equator, between five and ten degrees of north latitude, the range of the barometer is so small and so regular, as to time, that any such or similar instrument may be verified, while crossing that zone, more satisfactorily than by a removal to the shore for comparison with a standard, a test also of the utmost value to meteorological records made on long voyages with uncomparated instruments.

Another simple result deduced from multiplied observations, and as important as it is simple, is that in a gale or storm, while facing the wind, the centre of the circling or cyclonic current of the atmosphere is to the *right* in *north* latitude, but to the left in the southern hemisphere.

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\* Dampier, Halley, Hadley, De Foe, Franklin, Cook, Capper, Flinders, Redfield, Dové, Daniells, Kämtz, Espy, Sabine, Reid, Piddington, Herschel, and Humboldt, besides many other original observers; and compilers, among whom is the popular Maury.

Not that these rules are without occasional apparent exceptions—apparent rather than real—caused by a second, perhaps even a third cyclonic (or oval) eddy impinging on the first circulation, either horizontally or angularly (with reference to the horizon).

The *first* movement may be likewise more or less inclined to the horizontal plane, if not occasionally almost vertical, as in a “*descending squall*.”

Such phenomena are readily explicable, after due consideration of Dové’s theory of polar and equatorial currents (translated and published by the Board of Trade), and they are so marked by “*weather-glasses*” that it is now inexcusable to navigate without them or to undervalue their warnings.

Why the barometer rises and falls, *how* it and its indispensable companion the thermometer are affected by a coming change, are questions often asked by the inexperienced in their use, and may be answered here in a few sentences (from the Meteorological Department) for the benefit of such young travellers or voyagers as have yet the world and its marvels before them.

“Cold, dry air, coming from a polar direction, is heavier in specific gravity than warm, moist air (containing gas or aqueous vapour) flowing from tropical or equatorial regions.

“The normal condition of our atmosphere is a continual rising and westward movement of inter-tropical, or rather *sub-solar*, atmosphere, consequent on its expansion, and being lightened by the sun’s action while the earth is rotating on its axis.

“This rise and westward impulse is accompanied by general movement, from polar directions, to fill the space that would otherwise become *comparatively* vacant. Air, like water, seeks equilibrium, but, unlike water, it is *very* elastic and *excessively* mobile.

“Yet air, however rarefied, cannot rise beyond a certain distance. Cold and gravity check its elevation. It must, however, move onwards somewhere. Having momentum, and being pressed behind by ever-rising air, it overflows (as it were) the polar under-currents and moves towards those regions which the polar currents have quitted and are *continually* quitting. But those regions are vastly smaller in area than the equatorial, and opposition, if not a conflict, occurs soon between the main streams or currents, so unequal in breadths and characters.

“Portions of the overflowing quantities from the sub-solar regions combine, between the tropical limits and near thirty degrees of latitude, with the normal and general movement (called *trade-*

winds or monsoons), and other parts divide, mix with, or oppose the polar currents in a variety of ways, between the tropics and arctic (or antarctic) regions.

“Such currents sometimes flow side by side, though in opposite directions, as ‘parallel streams,’ for hundreds or even thousands of miles.\* Sometimes they are more or less superposed—perhaps, or indeed *frequently* crossing at various angles;† sometimes combining, and by the *composition* of their forces and *qualities* causing those varieties of weather that are experienced as the wind veers more toward or from the equator or the nearest pole; and sometimes so antagonistic in their angular collision as to cause those large circling eddies or rotatory storms called cyclones (in modern parlance), which are really like the greater storms in all parts of the world, although they do *not* quite assimilate to those local whirlwinds, dust-storms, and other commotions of atmosphere which are more *electrical* in their origin and characteristics.

“Whenever a polar current prevails at any place or is *approaching*, the air becomes heavy, and the barometer is high or rises. When the opposite (tropical or equatorial) prevails or approaches, the mercury is low or falls, because the air is, or is becoming, specifically lighter, and these changes take place *slowly*.

“Whenever, from any cause—electrical, chemical, or simply mechanical—either current, or any combination of currents, ceases to press onwards‡ *without being opposed*, a gradual lightening of the atmosphere, through a greater or less area of hundreds, or perhaps thousands, of miles occurs, not suddenly, but very gradually, and the barometer falls.§

“To restore equilibrium, the nearest *disposable* body of air (so to speak) moves first; but an impulse, at the first time, may have been given to other and greater masses that—though later in arriving—may be stronger, last longer, and cause greater pressure *mechanically* as well as by combination. Air, like water, mingles *but slowly*, either from above or laterally.

\* Like Sabine's currents of the sea, on the coast of Africa.—‘Pendulum Experiments.’

† Green, Rush, and Welsh.—‘Balloon Ascents.’

‡ If *opposed* mechanical pressure increases; and this may be caused by high land, as well as by opposing wind.

§ Evaporation, rarefaction, or condensation of vapour in air, reduces its specific gravity—the two former by expanding bulk, and rendering it lighter; the latter, through mechanical diminution of quantity, by falling to the earth as rain, &c. Moreover, there is more or less motion, *away* from the place of stationary air, which tends to lessen its elasticity or pressure, and cause the barometer to fall.

“Taking, with Dové, north-east and south-west as the ‘wind-poles,’ all intermediate directions are more or less assimilated to the characteristics of those extremes; while all the variations of pressure, many of those caused by temperature, and all varieties of winds, may be clearly and directly traced to the operations of two great normal currents—equatorial or tropical, and polar.”

Young travellers, and more particularly intending voyagers, may find this subject systematically, though popularly treated, according to the views of Herschel and Dové, in recent publications of the Board of Trade.\*

#### AMERICA.

*Arctic.*—The award of the Founder’s and Patron’s Medal to Lady Franklin and Sir L. M’Clintock by the Council of this Society, and their reasons for coming to this conclusion, dispense with my entering into as much detail as would otherwise be required in that portion of my present review which relates to the Arctic regions.

It is no small satisfaction to me, however, to have to record in the annals of the Society, during the year of my Presidentship, such remarkable events as the solution of the fate of the *Erebus* and *Terror*, through the efforts of Captain M’Clintock and his officers, and the revelation of the discoveries of Franklin by the attainment of the only written document which has rewarded the search during a period of twelve years. This document, buried thirteen years ago in a spot so lonely that not even the feet of the wandering Esquimaux ever approached it, has crowned the latest of the Arctic expeditions with a success and a renown which the preceding ones perhaps equally merited, but were not so fortunate as to obtain. In combination with other memorials which fell under the notice of the exploring parties from the *Fox*, this rustworn, tattered, but precious document leads us to believe that our unfortunate countrymen, the pioneers and the martyrs of the last decade of Arctic exploration, perished in the accomplishment of their mission and placed the keystone into that wide arch, built up at intervals during many generations, which connects the Atlantic and Pacific Oceans. In giving to the Franklin Expedition the honour of being the first discoverers of a North-West Passage, it needs not to be explained that there is scarcely an individual name known in Arctic

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\* Sold at the cost of paper and printing only, by the Government agent, Mr. Potter, in the Poultry, London.

navigation for the last forty years which has not given a helping hand to the solution of this great problem ; but, in speaking of the amount of discovery, it is but fair to state that, out of the 2060 miles which intervene between the discoveries of Baffin from the side of the Atlantic, and those of Cook from the Pacific—in other words, the north-west passage between the two oceans—no less than 1260 miles were explored and navigated under the command of Sir J. Franklin himself, either by boat or ship. In his last fatal expedition, upwards of 560 miles of unknown waters were navigated by the *Erebus* and *Terror*, which vessels, previously to taking up their quarters at Beechey Island for the first winter, pushed their explorations as far north as 77° N. lat., when, having satisfied themselves of the impossibility of finding a passage in that direction, they returned to Beechey Island by a channel to the west of Cornwallis Island, and in the following summer proceeded in the direct execution of their mission by taking a southerly course towards the coast of America, in order, if possible, to obtain a connection with those already known waters extending from Back River to Bering Strait. In the month of September, 1846, they attained a position off the north-west point of King William Island, or, as the Admiralty chart of that day represented it, King William Land, it being supposed to form part of the continent. They were here distant but 90 miles from the channel which had, many years before, been navigated along the coast of North America, and *which it was Franklin's object to enter*. In the following spring, before the navigation was open, a party was detached from the ship to follow the coast-line of King William Land to Cape Herschel, and thus connect the recent discoveries with those of former years. A marginal note of later date, on the same document, records the death of Sir J. Franklin in June, 1847, and the abandonment of the ships in April, 1848, by the survivors, 105 in all, who, under the command of Captains Crozier and Fitzjames, commenced their retreat on the Back River. Beyond the last-named date we have no written evidence of their proceedings. They *must* have been in a state of great debility and disease, dropping one after the other, though some were able to reach as far as Montreal Island in the estuary of the Back River, where remains of clothing and equipment were found, but no skeletons, as upon King William Island.

The labours of Captain McClintock and his companions have not only procured for us this authentic information as to the proceedings of the Franklin Expedition, but have added materially to our geo-

graphical knowledge ; 600 miles of new coast-line have been discovered, and the gap completely filled up between the old and the new discoveries along the continent of America, thus enabling us correctly to delineate on our maps the most northern extremity of the New World and supply the deficiency which the absence of any detailed account of the voyage of the *Erebus* and *Terror* has left. Independently of the interest which these exciting discoveries have created in the public mind, the simply-told narrative of Sir L. McClintock will remain a standard work among voyages and travels, and the admiration of his gallant conduct in persevering in the object of his voyage after the discomfiture of the first year will remain an example to after ages.

A very interesting addition to the remarkable voyage of Dr. Kane has been recently added by the publication, by Mr. Bentley, of Dr. J. L. Hayes' narrative, detailing the proceedings of a portion of the crew of the *Advance*, which left that vessel in Van Rensselaer Bay in August, 1854, and lived among the Esquimaux for several months. Influential meetings have been held by the different scientific societies in the United States, with a view to raise subscriptions to enable Dr. Hayes to return to the scene of his labours under our lamented Medallist, Dr. Kane, and follow up his explorations towards the Pole. Should a sufficient sum be raised, it is his intention to proceed to Smith Sound this summer, and go to the north along the coast of Grinnell Land.\*

Professor B. Silliman, in a letter to Sir R. Murchison, relates that a gentleman from Cincinnati, with *one white* companion and several Esquimaux, intends proceeding in a New London whale-ship in search of a portion of Sir John Franklin's men, whom he believes to be still alive. And our own countryman, Mr. Parker Snow, formerly second in command to Captain Forsyth, in Lady Franklin's discovery ship *Prince Albert*, proposes to make another attempt to ascertain the details of the fate of the lost expedition by renewing the search for those journals, records, and other traces which he expects will be found during an exploration *in summer*, when the ground is free from its winter covering. The proposal has met with the approval of several of our highest Arctic authorities. Mr. Snow hopes to be able to proceed through Bering Strait, and to follow the line along the American continent so successfully adopted by Captain Collinson.

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\* Dr. Hayes has since sailed from New York.



Mr. Alderman T. Hopkins, in a paper read before us, proposes to reach the Pole, by proceeding to the north, between Spitzbergen and Nova Zembla. He presumes that as Parry met with a southerly current in the meridian of Spitzbergen, a contrary one will be found farther to the east, and, from the prevalence of south-westerly winds, it is his opinion that high land will be found near the Pole.

The scientific expedition proposed by the Swedish Government to explore Spitzbergen and the North has, as our associate, Count Platen, informs us, been postponed until next year, in order to be more fully organised.

*Proposed North Atlantic Telegraph.*—Though not an Arctic subject—as the line which Colonel Shaffner of the United States proposes to lay the Atlantic telegraph does not come within the polar circle—yet as it is one in which the opinion of officers experienced in ice movements will have great weight, I am induced to place it in this portion of my Address. The difficulty experienced in rapidly transmitting messages throughout a great extent of wire induced Colonel Shaffner to turn his attention to a route by which, in every probability, there will be required no continuous length beyond 600 miles. After a careful investigation at his own expense last year, he believes that he has found suitable places for the termini of the wires in Labrador and Greenland, whence he proposes to lay the cable to Scotland by way of Iceland and the Farøe Islands. Some deep-sea soundings along this route have been obtained which denote a maximum depth of 2000 fathoms, and many of the Arctic navigators are of opinion that the fear of rupture by icebergs may be entirely obviated by a judicious selection of fiords up which the cable may be carried.\*

*British North America.—Palliser's Expedition.*—Accounts have been received from our Medallist, Captain J. Palliser, of the safe arrival of himself and party at Colville on the Columbia River, where, in compliance with his instructions, his explorations cease.† After spending the winter at Fort Edmonton, during which season several arduous journeys were performed on the snow by himself and the Geologist, Dr. Hector, which contributed largely to the geographical results of the expedition, Captain Palliser, having organised his party, proceeded towards

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\* See page cxxxv.

† Captain Palliser and his scientific companions have since returned to England.

the South Saskatchewan River, following the course of Red-Deer River. By reaching within a few miles of the point from which he turned in his first season's explorations, and thence proceeding westward to the Rocky Mountains, keeping between the South Saskatchewan and the Boundary line, he thus completed the survey of the great and hitherto unknown Prairie region. His Report shows that the arid tract which is known to occupy the centre of the North American continent extends for at least 2° into British territory. The greater portion of the country adjacent to the South Saskatchewan and Red-Deer River he found to be deficient in moisture, and only supporting a very scanty pasture. At the Cyprée Hills, however, which lie about 40 miles north of the frontier line, in long. 111° w., there is abundance of wood, water, and grass.

After thus spending the early part of the summer in completing the exploration of the eastern prairie country, he despatched Dr. Hector to traverse the mountains by a northern route, while, accompanied by the Astronomer, Mr. Sullivan, he himself crossed by the Kutanié Pass to Fort Colville.

From that point Mr. Sullivan explored eastward towards the Rocky Mountains, and describes a succession of transverse valleys by which a road, striking the valley of the Kutanié River by either the Kananaskis or Vermilion Pass, could be continued westward within British territory. At the same time Captain Palliser continued an examination of the country to the west of the Columbia, likewise keeping within British territory, until he met the Boundary Commission and also Lieutenant Palmer, R.E., whose reconnaissance of a trail from Lower Frazer River to Fort Colville has also been laid before this Society. As likewise, by the valley of the Okanagan River, there is known to be an easy communication with the gold mining region, the connection of the Saskatchewan plains east of the Rocky Mountains with a known route into British Columbia may be considered as one of the chief results accomplished by the expedition. Dr. Hector, after leaving Captain Palliser, followed up the South Saskatchewan, and crossed the mountains by a "pass" in the neighbourhood of the 52nd parallel, when, after striking the Columbia and within 60 miles of his exit on Thompson River, his exploration was closed by the advance of winter and the want of provisions, while forcing his way through timber so dense that he could not penetrate faster than from three to four miles a day. He reports, however, that he encountered no physical obstacles to the

construction of road, so far as he explored. The absence of game, and the difficulty of carrying provisions, owing to the luxuriance of the forest growth, appear to render the exploration of the country to the west of the Rocky Mountains an extremely difficult and expensive task.

The results of this most important expedition will in due time be laid before the Society, and published in its Journal.

*Hind's Expedition.*—Great credit is due to the Canadian Government for the energy with which they have pushed their explorations into the vast region lying to the west of Lake Superior and the country drained by the Winnipeg, Red River, and the Saskatchewan. The reports of the Assiniboine and Saskatchewan expedition under the charge of Professor H. Y. Hind,\* introduce us to a large tract of country respecting which comparatively little was known. The great lakes of the Winnipeg basin, embracing a water area exceeding 13,000 square miles, are bounded to the west by the abrupt and precipitous escarpments of the Riding, Duck, Porcupine, and Pas Mountains, which bear marks of their having once been an ancient coast line, when the ocean was relatively 1600 feet above its present level; the low region east of these mountains being the result of denudation. On their western flanks these ranges descend in steps and gentle slopes to the fertile valleys of the Assiniboine and Swan rivers, and are densely wooded with valuable forest trees. The area of arable land of the first quality between the Lake of the Woods and the Grand Forks of the Saskatchewan is estimated by Professor Hind to exceed 11,000,000 acres; and an additional area of equal extent is fitted, even in its present condition, for pasturage.

Wheat and Indian corn have been grown at all the posts of the Hudson Bay Company, and at the missionary stations scattered over this belt of fertile country. Although the low region east of the Riding and Duck Mountains, and partly occupied by the Great Lakes Winnipeg, Manitobah, and Winnipago-sis, is generally unfit for the permanent habitation of civilized man, yet it has been found to contain an inexhaustible supply of that great necessary of life, common salt. The brine springs occupy a strip of country extending from the 49th to the 54th parallel, and thence towards the valley

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\* North-West Territory. Reports of Progress; together with a Preliminary and General Report on the Assiniboine and Saskatchewan Exploring Expedition. By Henry Youle Hind, M.A., in charge of the Expedition. Printed by order of the Legislative Assembly, Canada, 1859; also in a Blue-Book, Eyre and Spottiswoode, London, 1860.

of the Mackenzie. In the cretaceous shales, which form the base of the country drained by the Little Souris, and part of the Assiniboine, clay iron-stone of remarkable purity and in great abundance has been found to exist, while on Battle River and the north branch of the Saskatchewan Dr. Hector discovered an abundant supply of lignite coal.

West of Assiniboine the country furnishes limited areas well suited for settlement, but the south branch of the Saskatchewan flows through a region which from its aridity will probably never be generally occupied by civilized man.

A very important and curious feature in the surface of the great prairie-plains drained by the Saskatchewan and the affluents of Red River is the numerous deep river-channels, which cut the country to the depth of 300 and even 400 feet. The most remarkable example is that of the Qu'appelle river and valley, which form a continuous water communication from the south branch of the Saskatchewan at the Elbow to the Assiniboine near Fort Ellice. The entire length of this valley was traversed, partly in canoe and partly on horseback, by Professor Hind's expedition, and instrumental measurements were taken of its leading dimensions. Its least depth is at the height of land, 12 miles from the Elbow of the South Branch; here it is 110 feet deep and one mile broad. From a small lake in this part of the valley, water flows both to the Saskatchewan and the Assiniboine, 257 miles to the east. The narrow lakes in this valley have a depth of 66 feet, and are 57 miles long in the aggregate; the bottoms of the lakes in some instances being about 350 feet below the prairie level. Other communications between the South Branch and the Assiniboine exist besides that of the Qu'appelle valley, showing that the prairie-plains which they intersect have probably been subjected to a slow but continuous process of upheaval, whereby river-courses have been changed and the numerous Elbows originated, which form such a curious feature in the prairie rivers of the basin of Lake Winnipeg.

With a vast area of fertile soil, and a climate favourable to the cultivation and growth of wheat; with lignite coal, iron-ore, and common salt in abundance, a great future is probably in store for the Basin of Lake Winnipeg. Lying between the rich gold-fields of British Columbia\* and the powerful, populous, and wealthy colony

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\* *Vide* Papers relative to the Affairs of British Columbia, Part III. Blue-Book, 1860; and page cxxxviii of this Address.—Ed.

of Canada, it is only a question of time how soon its vast capabilities and resources will be developed, and that position assumed when, as a British colony, it will also become instrumental in carrying British institutions, associations, and civilisation across the continent of America.

*Dawson's Expedition.*—The expedition under Mr. S. J. Dawson, C.E., undertaken with a view of ascertaining the best route from Fort William to the River Saskatchewan, has resulted in giving us considerable information and several maps of the country.

In a paper addressed to the President and Council of the Society, our associate, Captain M. H. Synge, R.E., who for several years has devoted much attention to this subject, earnestly appeals to the Society in favour of the British North American Route, as shorter, quicker, more favourable as to winds and currents, more salubrious, more comprehensive, inviolable, perfect in its water-communication, and causing the colonization of British North America in great part. Captain Synge briefly adverts to the enhanced value of the project caused by the events of the last few years.

*Mexico.*—Our learned Corresponding Member, Professor Paul Chaux, of Geneva, has forwarded to us an interesting account of an excursion to an ancient volcano in Mexico, which will appear in the next volume of our Journal.

*Central America.—Honduras Interoceanic Railway.*—From a Report which has recently been published, it appears that the survey has established the following facts—that Port Cortez, on the Atlantic (lat. 15°49' N.) and Fonseca, on the Pacific (lat. 13°21' N.), are both first-class harbours; that across Honduras is a perfectly practicable route for a railway of 220 miles in length to connect those harbours. Mr. Trautwine, the superintending engineer, reports that the result of the survey is the establishment of the interesting and important fact that there exists through Honduras a perfectly feasible route for a railway, with natural harbours at its ocean termini, the existence of which must be regarded as a controlling feature in an enterprise like that proposed, and which derives peculiar importance from the fact, that throughout the entire extent of Central America there occurs no similar instance in combination with a route so favourable as that developed in the survey.\* Colonel Stanton, R.E., reports that the harbours are unexceptionable, and that the road can be constructed without any sharper curves or heavier grades than are to be found on existing lines over which locomotives work without difficulty.

\* See 'President's Address' for 1859, p. ccviii.

Mr. Maximilian de Sonnenstern, for many years engaged in surveying Central America, is engaged in publishing his map, in four sheets, which will comprise Guatemala, Honduras, Salvador, Nicaragua, and Costa-Rica.

*South America: Equador.*—Several papers which have been communicated to the Society must not be passed over without the special mention they deserve. Our forthcoming "Journal" will contain the narratives of no less than three travellers who have been engaged in explorations of the State of Equador, namely, of Mr. G. J. Pritchett, who traversed the greater part of it in various directions in the years 1856 and 1857; of Mr. Spruce, a botanist (for whose Journal we are indebted to Sir William Hooker), who, proceeding from Tarapoto, in Peru, to Baños, in the State of Equador, passed down the river Huallaga to the Amazon, and thence, ascending the rivers Pastaza and Bombanaza to Cañelos, visited the great volcanic regions of Chimborazo and Cotopaxi, and the eastern portion of the provinces of Leon and Quito, collecting information regarding the natural products of those countries, which is of great interest; and lastly, of Mr. Jameson, who has resided for many years at Quito as a Professor in the University, and has sent to the Society an account of a tour which he made last year, during one of his vacations, as far as Cayambe.

The narratives of these gentlemen comprise a considerable mass of original information regarding the State of Equador and its natural resources. I may also add that we have received a copy of the map of that Republic, by Dr. Villavicencio, mentioned as in course of publication by my predecessor in his Address in 1858.

*Chile.*—Mr. Wheelwright's gigantic project of a railway over the Chilian Andes, from Copiapo and across the Argentine provinces to Rosario on the river Parana, an account of which was read before the Society in January last, has led to a survey extending no less than 350 miles over the Great Cordillera of the Andes, and thence across the slopes and plains beyond, to the river Parana, a copy of which, accompanied by sections, has been communicated by Mr. Wheelwright to the Society, and will be found full of interesting matter connected with the climatology, mineral and other products of those hitherto undescribed regions.

The Government of Chile is making progress in extending civilization to the south of that Republic in the direction of Patagonia, among fertile plains occupied by savage people; but capable of supporting large populations, whenever the tide of emigration may set in that direction. In Chile the working of the coal veins

is being greatly extended. This increase of production is of great importance, not only to the steam vessels of all nations frequenting the Pacific, but also to the various copper and silver melting establishments in that productive mineral country.

*Brazil, &c.*—The railroads now in course of construction from the Atlantic coast into the interior of South America, as at Pernambuco, Bahia, and San Paolo in Brazil, will not only be of benefit to commerce by developing the resources of these vast countries, but also lead to a more accurate and familiar geographical knowledge of them. Our own Captain Sullivan and Captain Page of the United States navy, by their interesting river-exploration have already, as you know, thrown great light on the capabilities of the fertile regions on the western frontier of Brazil as well as of the Argentine provinces.

*Patagonia.*—H. M. Minister at the Argentine Confederation has communicated to us letters on maps of Patagonia, by Mr. H. L. Jones, which assist in throwing some light on this unexplored region of the world.

*Tierra del Fuego.*—Since the Admiralty Survey of this portion of South America by Admiral R. FitzRoy, in 1830-36, little has been done to open out its natural resources. Mr. Parker Snow has partially examined the islands in the vicinity of Cape Horn, and found good harbours with fresh water supply, with easy access to vessels, where they might refit any damage sustained in rounding the Horn. A fresh survey of these parts is much needed, to make known its harbours, develop its resources, and bring its yet savage inhabitants in communication with the civilized world.

*Falkland Islands.*—These islands afford many harbours of refuge, as shown by the surveys of FitzRoy, Robinson, and Sullivan; many parts are fertile and productive. At present Stanley Harbour is the principal Government station, but the missionaries have stations on the western islands.\*

#### AFRICA.

Geographical science has made considerable advance in the African continent since our last Anniversary. The labours of Captains Burton and Speke are published in our Yearly Journal,

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\* For other mention of these subjects see Captain Washington's lucid sketch of Admiralty Surveys during the past year; and for the important records of geographical progress in the United States of America, I must refer to our Medallist, Professor Bache's Coast Surveys, the Journal of the Geographical Society of New York, and other excellent works published in America.

which is almost wholly occupied with an account of their expedition, from the pen of its leader: so ample in its contents, so rich in observation, so minute in description, as to make us marvel at the energy of the man who, prostrated and half-paralysed with fever and its consequences, nevertheless continued to observe, question, and note down the enormous number of facts therein contained, that elucidate the ethnology and condition of negro society in Eastern Africa.

The result of the careful mappings of Captain Speke is appended to Captain Burton's Paper. Full justice has now for the first time been done to his work: for the astronomical observations have been re-computed by Mr. George at the Society's rooms; the itineraries and bearings have been examined and collated, and his data protracted with the greatest care by Mr. Findlay.

The nature of every-day life among the negroes of Eastern Africa as pictured in numerous lights in Captain Burton's pages, is one that cannot fail to leave a painful impression on all lovers of the human race. It is not only the reckless cruelty of the people that shocks us, nor their slave-dealings nor marauding propensities, nor their degrading superstitions and incurable indolence, for we are fully prepared to accredit any rude race with all or any of these qualities, but it is the picture of one unbroken spread of vulgar, disunited, and drunken savagery over the entire land, connected apparently with fewer redeeming qualities than are possessed by any other race with whom previous travellers have made us acquainted. In fact, it is hard to discover a single trait in East African character, as described by Captain Burton, upon which we are able to dwell with pleasurable recollection. The very features of the land have a repulsive aspect. His description leaves us with the idea of a fever-stricken country that is skirted by a wide, low-lying belt of overwhelming vegetation, dank, monotonous, and gloomy, while it reeks with fetid miasma.

The difficulties in the way of a thorough exploration of this country seem enormous. The porters and servants of an expedition in this land of rude equality are insubordinate, and held together by the slightest possible restraint. They act on impulse, abandoning their loads and decamping at slight temptations, while hardly any inducement can persuade them to violate routine by deviating the smallest distance from the established track. The tyranny of custom, as well as the tyranny of brute force, is established in these lands with a power that we, nurtured in freedom, find it hard to conceive.



The distribution of races throughout Eastern Africa is a subject on which Captain Burton has given us a large mass of material. The time is, however, hardly ripe for a full examination of this subject. Other expeditions are in progress, to which we shall shortly refer, from whose joint results, together with what is now before us, we may hope soon to learn with tolerable accuracy the broad features of the ethnography of Africa: whether, for instance, the South African races are or are not separated by a sharp line of demarcation from those of North Africa; and again the number and direction of the chief lines of ancient migration. Captain Burton shows some cause to connect the appearance of the Caffre races in South Africa with the pressure exerted in the interior by the first spread of the great kingdom (now utterly broken up) of the Wanyamesi.

Most of what we positively know of the physical features of the land in question is to be seen at a glance in the map. We there trace the route of the expedition, its sectional elevation, and a part of the shores of the two lakes Tanganyika and Nyanza, the former of which was partly navigated, the latter only reached by the expedition. We do not know from the certain evidence of the eye-witness of our travellers what the affluents of the former lake really are, nor whether it has any outlet. Neither of the two ends of the Tanganyika were visited, owing to the want of proper boats and the obstruction of the natives. We have in consequence no better authority than that of native testimony for the tributaries represented as entering the lake at its northern and southern extremities. The configuration of the country to the northward gives us excellent reason to believe that the northern tributary is correctly described; but whether the river mentioned as *entering* the lake at the south does not really *run out of it* is a fair matter for discussion.

It is indeed a strange hydrological puzzle if a lake, situated in the damp regions of the equator, subject to a rainy season that lasts eight out of the twelve months of the year, and supplied by considerable rivers, one of which is stated to be saline, should have no outlet whatever, and yet retain its elevation unchanged, its evaporating area invariable, and also the sweetness of its waters uncompromised. We may speak to much the same effect of the lake Shirwa, lately visited, but not yet thoroughly explored by Dr. Livingstone. To make the matter more strange, we find the Nyassa lake, closely adjacent to the Shirwa, and not far distant from the Tanganyika, and of approximately the same elevation, gives exit to a splendid river, the Shiré, which Livingstone describes as

being at its outlet 150 yards broad, 10 to 12 feet deep, and running at  $2\frac{1}{2}$  knots an hour. Lastly, there is this farther unexplained peculiarity, that, contrary to the Zambesi, and to the properties of all rivers in Tropical Africa, the variation in the height of the Shiré in the wet and dry seasons does not exceed the remarkably small amount of 2 or 3 feet.

Now if we venture to disregard native testimony altogether on that one point in which native testimony is perpetually misleading travellers, namely, the direction of the current of a river, the facts at present before us appear not only not contradictory, but even lend considerable probability to the theory that the Nyassa is connected with the Tanganyika, and that the Shiré may be the outlet of both of them, and also to the surplus waters of the Shirwa.

First, as to the elevation above the sea of the water-levels of these lakes. Speke places the Tanganyika at 1844 feet above the sea. Livingstone places the Shirwa at 2000. He has not yet given us the altitude of the Nyassa, but he reports that its waters are described as being separated from those of the Shirwa by a mere spit of land, which assuredly would be flooded in *some* seasons (if the Shirwa had no kind of outlet); and a water-way worn between the two lakes if there were not a free intercommunication between them through a porous soil, if by no more direct channel. In this way the surplus waters of the Shirwa might find an ultimate outlet by the Shiré.

Next, as to the recorded depression of 166 feet of the Tanganyika below the Shirwa or the Nyassa. This quantity is far too minute to be relied on as accurate, considering the nature of the observations employed by the two travellers, which were simply the record of the temperatures of boiling water, corrected for the temperature of the air. This simple and excellent method of determining heights approximately is wholly unreliable in a case like this unless special precautions be taken, and certain comparisons be made which have not been made in the present instances. For example, the thermometers require to be verified at the close of a journey as well as at its commencement, because their index errors are found to vary continually by a slight but accumulative change. Speke's thermometer had varied  $1^{\circ}$  Fahr. from first to last, which represents an altitude of 535 feet. Again, the variation of barometric pressure, though small between the tropics at sea, is even there sufficient to cause an error of 100 feet in any one observation, or a differential error of 200 feet between two observations, sup-

posing the variation to have acted in opposite directions; and the variation is greater on shore than at sea. There are other distracting causes, well known to observers, which I need not dwell upon here, having already said enough to show that we cannot rely for a moment on the recorded differential altitude of 166 feet between the two lakes. All that we are justified in saying at the present moment is that the three lakes, Tanganyika, Nyassa, and Shirwa, appear to be of about the same level, and that it is quite possible the Tanganyika may be the highest of them all. If it be so, and if the Tanganyika be connected (it may or may not be through a chain of small lakes) with the Nyassa, we should have an immediate solution of all our difficulties. The surplus waters would be accounted for, and the non-variation of the height of the Shiré river would also be accounted for, because the rains, as they followed the course of the sun, would never entirely leave the lake district during any part of the year. It is a district that would extend with more or less intermission in a long meridional strip of no less than  $13^{\circ}$  of latitude, beginning with lat. s.  $16^{\circ}$ , and ending with lat. s.  $3^{\circ}$ .

Far be it from me to press forward this solution in an undue manner. African geographers have too much cause to distrust geographical speculations; but I wish clearly to point out both the magnitude of the hydrological difficulties which embarrass us, and also the wide limits within which our speculations are obliged, for the present, to rove, in the absence of a few fundamental facts.

Captain Speke has again set sail for Africa. He has started, accompanied by our associate Captain Grant, under fair auspices again, and bound for the discovery of the sources of the Nile. This Society has abundant reason to acknowledge the liberal spirit in which Her Majesty's Government has acted in supporting this expedition. Captain Speke's instructions are to make the best of his way to the point whence he before turned back, at the southern end of the lake Nyanza, and thence to explore to its northern extremity, seeing whether or no it has a northern outlet. If there should be no connection between the Nyanza and the Nile, he is to use the best of his judgment in prosecuting his search to the sources of the latter, and finally he is to endeavour to reach Gondokoro, the missionary settlement formerly occupied by Knoblecher, and stated to be in N. lat.  $4^{\circ} 25'$ .

We are rejoiced to say that Captain Speke is not the only traveller on the Zanzibar coast. Dr. A. Roscher, a native of Hamburg, pro-

ceeded to Zanzibar in 1858, and in 1859 travelled along the coast as far as Kilwa, and explored the lower course of the Lufiji. In a letter dated Zanzibar, November 21, 1859, he is said to have been met half way to the Nyassa. A Hanoverian gentleman, the Baron von Decken, who is known as a keen Algerian sportsman, and who is by no means unversed in the manipulation of geographical instruments, has already set sail for Zanzibar with a view towards a lengthened wandering among the Kilimandjaro range.

Consul Petherick's daring overland expedition to the southward of the Bahr el Ghazal is a successful feat that has taken all African geographers by surprise. The weapons and utensils that he has brought back from the interior are exceedingly curious; among them we find iron boomerangs, with sharp cutting edges, a most fearful instrument in savage warfare. The Bari people, who use them, are the only others in the world besides the Australians who appear to have discovered the singular properties of that strange projectile. The interest of Mr. Petherick's journey is very great, for he introduces us to an entirely new race of negroes, and its value will be largely increased when either his own astronomical observations, on a future occasion, or those of Captain Speke, shall have localized with certainty the scene of his late exploits. We have, farther, to acknowledge Mr. Petherick's valuable advice and offers of assistance in regard to Captain Speke's relief, should that officer reach Gondokoro.

From our enterprising associate, Mr. Cyril Graham, we learn that, wishing to go to Thebes, and not desiring to accompany the travellers passing up the Nile, he went to Suez, and embarked on board a vessel, with 300 Hagijis, bound for Mecca. They ran along the western shores of the Red Sea, until they reached "Cosseir," in lat. 26° N., where he landed, and proceeded towards Thebes. After four and a-half days' camel travelling, he reached Thebes, and passed through a country peopled by blacks, called Ababech. There was no water between this place and the Nile; a spring is found two days south of Cosseir, which supplies that place. The country crossed abounds in valuable mineral productions, as green and red porphyry, much prized by the Egyptians 5,000 years ago. To the south of this are gold and silver mines, although much exhausted. Mr. Graham remained 15 days at Thebes, and then started for the desert, and, travelling northward, reached Cairo in safety, after making the circuit in 37 days, over nearly 1,000 miles. Mr. Graham says that this journey had never been made before,

and that he was repaid by the discovery of several interesting inscriptions. Here Mr. Graham remained a few days to translate a valuable Arabic MS., and then intended leaving for Syria to spend the summer, and then re-visit the Haurán, hoping to penetrate into Arabia.

Our eminent explorer, Dr. Livingstone, has added largely to his former laurels by his explorations of the Shiré and Shirwa. I need not here recapitulate what has already appeared from time to time in the published "Proceedings" of this Society, and is, doubtless, familiar to all of us. His vessel, the *Ma Robert*, has, for some time, failed to satisfy his needs; and he awaits, in company with the remainder of his party, a new steamer, promised by the Admiralty, and now being constructed.\* Mr. R. Thornton, the geologist, has quitted the party, and is at the present time conducting an expedition on his own behalf, of which some few scanty tidings have reached us.

Although much zeal is being shown by the Portuguese, in collecting and publishing the ancient and modern travels of their compatriots in Africa, it is remarkable that the numerous travellers of whom we have more or less information, should have contributed to so small an extent as they have done to a knowledge of the geography of South Central Africa.

This fact shows, in unmistakeable colours, the wide difference between a mere transit from one point to another, and that of a scientific exploration of a line of route. Unless the day-book be accurately kept, and astronomical observations be made from time to time, the narrative of a traveller is almost sure to become a chaos to the student. This has been the case with Portuguese discoverers generally, with the sole exception of Lacerda, who died in Central Africa more than half a century ago. The journey of Silva Porto, which was read some months since before this Society, and which will appear at length in its next Journal, is perhaps the most instructive of the mere narratives. It will be recollected that he was selected by the Governor of Angola as the most proper person to accept the proffered safe conduct of those Arabs who had previously crossed the continent from the eastward, and were about to return; and that he did return with them to Mozambique, and passed Livingstone, as that explorer issued for the first time from

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\* The *Pioneer* has just started, under the command of our associate, Mr. D. May, R.N.

the interior; and that he had crossed Africa and reached the Eastern coast about the same time that Livingstone first emerged at the western. Silva Porto's journey, running as it does roughly parallel to that of Livingstone, and to the northward of it, affords not a few points for comparison and verification, which have been ably discussed by Mr. J. Macqucen, and illustrated by a map which will be published at the same time with his paper. Perhaps at some future date the zeal of African geographers will give us, in a condensed form, the tangible results of Portuguese discovery from the earliest times—a subject of much historical interest, and not without present geographical importance. For the present we depend, in matters of South Central African geography, almost wholly upon what we have learnt from Livingstone, Lacerda, Burton, and Speke. For a knowledge of the exports, and imports, and commercial capabilities of the Mozambique coast of Africa, we are largely indebted to the various data collected by Mr. McLeod, late H.B.M. Consul of that place.

On the western coast of Africa, Mr. Andersson's arduous attempts at traversing an exceedingly wooded country, along a line untravellered by caravans and requiring the constant use of the axe for a distance of some 300 miles, ended in that explorer reaching what appears to be the southernmost branch of the head-waters of the Zambesi. His progress was checked by a severe fever that had prostrated him and most of his party for a space of four months. His discovery makes it improbable that the course of the Cunene should be so long, and, consequently, that its volume of water should be so great, as native reports to the south of that river had represented it. It is easy to conceive that men living in an otherwise arid land should have their imagination deeply impressed with a perennially flowing river, and that an exaggerated reputation of its size should have penetrated to the dwellers in the bush and Karoo. The times are indeed changed from those in which, some few years ago, the Orange River of the colony was the northernmost running water of which English travellers had certain knowledge, excepting only a portion of the then far-famed Limpopo. Now, the Karri-harri Desert has been crossed by many tracks: the lake Ngami, which then was usually considered a myth, has been long since searched out and overpassed; and the great length of the mighty Zambesi is familiarly known.

Through our honoured Associate, Sir William Hooker, we have received some very good memoranda of a Trading Trip into the

Orange River Sovereignty, and the country of the Transvaal Boers, in 1851-2, by Mr. J. Sanderson, which will be published in our Journal, with a map by Arrowsmith.

Farther to the north I have to direct your attention to a remarkable exploration by Du Chaillu, an American naturalist, of French descent, sent out by the Academy of Philadelphia. I speak of his discoveries in the equatorial regions of West Africa. That traveller, during a period of four years, spent in wanderings in pursuit of natural history, which has resulted in a very valuable collection, discovered that what had been hitherto considered as two distinct rivers, namely, the Nazareth and Mexias, running into the sea at *lats. s.*  $0^{\circ} 41'$  and  $0^{\circ} 56'$  respectively, are, in fact, the delta forming mouths of a single important stream, which also inosculates and in part discharges itself through the Fernando Vaz or Camma. His travels extended to a very considerable distance in an easterly direction. He found the main stream, called the Ogobai, to be formed by two enormous tributaries, the Rembo Apingi to the south and the Rembo Okandu to the north. He reached the former of these at an estimated distance of 350 miles of travel from the western coast, and found it a noble stream, 500 yards broad, from 3 to 4 fathoms deep, and running with great force.

Dr. Barth suspects the Ogobai to be the lower part of that river which he made out from information as running westward many days' journey south from Wadai, and he believes there is a vast field for future discovery along the northern branch of that river, viz. the Rembo Okandu. Du Chaillu has thus opened access to that great drainage of which Bowditch had already collected so much information, and we have now unexpectedly found an immense river—a rival, perhaps, in length and importance to either the Congo or the Zambesi, apparently more accessible to Europeans than either of them, and running into the sea at the very *waist* of Africa (if such an expression be permitted), the very place whence the central part of the equatorial regions of that continent may be reached at the least distance from the coast.

The results obtained during the last year by Dr. Baikie are not yet in our hands, neither does a decision appear to have been yet arrived at concerning the future destination of this expedition. Lieutenant Glover, R.N., has arrived in England from the Niger, and is preparing his surveys for the Admiralty.

A report has been circulated referring to a contemplated expedition of the French by two military detachments, the one from Senegal, and the other from Algeria, to converge upon Timbuctu.

In the mean time the district even immediately adjacent to Algeria is so far inaccessible to the French that the recent journey of Duveyrier to El Golea has justly earned the character of a daring adventure, and the often-repeated offer of a prize has induced no French traveller to hazard the dangerous route that is proposed to be followed by large caravans.

An Arab, M. Ismael Bonderba, educated in France and attached as interpreter to the "Bureau Arabe," has published an interesting account in the '*Revue Algérienne*' of his excursion from Algeria to Ghât. To the south of Wargla he traversed the region of sand and sand-hills termed El Edj, extending on one hand to the south of Golea, and on the other to Ghadamis. This enterprising gentleman had already before this made a journey from Hed Suf to Ghadamis in 1857. According to M. Bonderba's barometrical observations, Mr. Ravenstein informs me that the elevation of Laghnat is 2340 feet above the sea; that the land falls thence to the oasis of Wargla, and at Negussa the elevation is only 120 feet. From Wargla to Ghât the land rises again, and it appears that the drainage of this part, as far as the Jebel Noggur, is towards the Sahara of Algeria, enabling the French to obtain a large supply of water by means of artesian wells. The altitude of Ghât is 1830 feet, or considerably more than has been assigned to it by Overweg.

Some interest and probably no small degree of future importance is connected with the geographical researches which have, within the past year, been made by enterprising persons of African race.

Information has been received from the remarkable African republic of Liberia that the Messrs. Amos have returned from a tour of observation to the Falls of the Sinoa River, which place they recommend as the site of a future mission. Mr. Miller had just reached Monrovia from a tour to the Golah country, where also a mission is contemplated.

A much more considerable exploring expedition has been sent out by the Liberians. It occupied at least six months, and appears to have been ably performed by the Liberian travellers, Seymour and Ash. Though making no pretensions to scientific acquirements, they have furnished a very interesting narrative which is continued through many numbers of the '*Liberia Herald*.'

They reached the city of Quanga, situated in a mountainous region, a part of the Kong Mountains. Quanga is a large walled town, 2500 paces in circumference, having five gates, from which there are roads leading to other cities and towns. They state this city to be 287 miles from Monrovia, 384 from Grand Bassa, and



14 days' march from Sierra Leone. Sierra-Leone English is understood by some of the people.

In the course of their journey they visited several other large and populous towns, having well-constructed mud walls 12 feet high and 4 thick. The scenery is described as very diversified, and in some places charmingly beautiful. The population of the country is remarkably industrious; not merely having very extensive tracts under cultivation and raising a great variety of crops, including rice and corn, but exercised in many kinds of manufacture, weaving thousands of yards of cotton cloth, and working in iron and other metals. In some places the people may be considered wealthy. The women in one of the towns are described as beautiful; their clothing white cotton cloth, and their ornaments so rich that 30 dollars' worth of gold might be worn by one person. The quantity of silver was beyond the travellers' attempts at estimation.

Cattle, sheep, and goats appear to abound, and some of the cattle are very fine. Horses, which are said not to live in Liberia, were seen near the city of Quanga, and are valued at from 40 to 60 dollars.

It would not be doing justice to these African travellers to omit stating that they collected specimens and statistical information, noticed the natural history and geology of the country, made some ethnological and medical observations, and enquired into the religion of the inhabitants. Mahomedanism has been introduced by the Mandingoes, to whom these people are allied, but it seems to have a slight hold upon them. It is believed they would readily receive Christian instruction.

It was very evident that important commercial relations might be formed with the people whom these travellers visited. They received the strangers with almost universal kindness and interest; and the only serious difficulty which occurred, and which was nearly being fatal to both travellers, arose from their own imprudence in not sufficiently attending to the advice and direction of one of the head men.

A letter from Alexander Crummell, an American of African descent who received a part of his education at Cambridge, has been forwarded to Sir R. Murchison. It was dated from Cape Palmas, towards the southern extremity of Liberia, and gives some particulars of a journey up the Cavalla River to the distance of about 85 miles, near which point the navigation of this fine river

is interrupted by a fall and dangerous rapids. Other falls are said to exist 15 miles higher up the river.

The most remarkable, and as to its results that which is likely to prove the most important of the late explorations of coloured travellers, is that from which Dr. Delany and his companion Mr. Robert Campbell are just returned. They both proceeded from the United States; the former going direct to Africa, the latter coming to England, where, through the generous kindness of our members, Dr. Hodgkin, Henry Christy, and other gentlemen, he was provided with his outfit and free passage to the coast of Africa.

The travellers met at Lagos; and, by a journey full of interesting incident and productive of much valuable information, and giving them frequent important and promising intercourse with the natives and their chiefs, they reached the city of Alorie, situated about 400 miles from the coast, and in the route from the coast to the upper waters of the Niger; a course which, while the difficulties of navigating that river remain to be overcome, affords the most promising outlet for the productions of this part of Africa.

It should be stated that these travellers undertook their interesting tour on behalf of an Association of coloured Americans, who are anxious to find in the land of their forefathers a refuge from the slavery which weighs them down in America; and they hope, with justifiable ambition, to become the means of elevating the natives of Africa, while finding a fit scope for their own unrestrained energies and talents. The travellers have well performed their mission, and appear to have found an open door. They will doubtless soon give to the public, as well as to those who delegated them, the fruits of their researches.

We have already learnt from them that they found large and populous towns of industrious people. The cultivation of the ground is so extensively carried on that in one district they rode for seven hours through a continued succession of corn-fields, interrupted only by paths and a few bushes. Looms were extremely numerous, and considerable variety of manufacture was carried on. The horses in use among the people were some of them remarkably good, resembling the Arab breed. It will be remembered that our own able African traveller, E. Bowditch, when he visited the Ashantees, found at Cromane a solitary horse which the people had not learnt to use, and that he broke the animal for the king.

Dr. Delany and Mr. Campbell experienced great advantages in their African descent and appearance, and were received as

Europeans could not have been. They obtained by formal treaty, in which they were assisted by the well-known native African episcopal clergymen, Mr. Crowther and his son, the facilities and promise of toleration and protection which they sought for their constituents; and it must be added that this successful tour of nine months' duration on the continent of Africa cost them less than 100*l.*, which forms a striking contrast with our expensive expeditions.

#### ASIA.

*Syria*.—From our excellent associato, Sir Woodbine Parish, we have received the account of Sir Eyre Coote's journey from Bussora to Aleppo, which has been strongly recommended to be printed in our Journal, by no less an authority on this subject than our associate, Mr. Cyril Graham.

From Dr. J. Wortabet, M.D., we have also received an original MS. on the Hermon, and the physical features of Syria and Palestine.

*Persia*.—Our associate, Captain Claude Clork, has furnished us with a valuable paper on routes from Tehrán to Herát, then to Shahraad, and Tehrán to Bushir.

*Caucasus*.—Baron de Bode, the well known traveller, has given us a lively sketch of Hilly Daghestán, and the Lesghi tribes of the eastern chain of the Caucasus.

*Kuria Muria*.—A lively account of the Kuria Muria islands, by Dr. Buist, has been published in our Proceedings.

*Hindustan*.—In the past year we have had only two papers on the subject of the greatest of our dependencies, but these have been on a highly interesting portion of them—the mountain valley of Kashmir, the country of the Shawl, and the celebrated retreat of the Mogul sovereigns of Delhi from the sultry heats of the summers of the plain. These communications were in illustration of a beautiful MS. map of the Trigonometrical Survey of Kashmir, submitted to the Council by the India Office, and exhibited at one of our meetings. It represents the physical features of the country, and has been constructed, with great labour and care, under the direction of our medallist Colonel A. S. Waugh, by our associate, Captain Montgomerie of the Bengal Engineers, and is now being lithographed by Mr. J. Walker, Hydrographer to the Hon. E. I. Company, and will shortly be published. Here, at an average height of 6500 feet above the sea-level, we have a population, by race Hindu, occupying a country which in physical geography, animal and vegetable pro-

ducts, bears no small resemblance to Switzerland. The authors of these able contributions towards our better knowledge of Kashmir are two gentlemen connected with the celebrated Trigonometrical Survey of India, begun by Lambton, carried forward by Everest, and now about to be brought to a conclusion by Waugh, after sixty years' indefatigable and skilful labour. We can form to ourselves some notion of the difficulties encountered in the Himalayan portion of this vast undertaking, when I state that, out of the sixteen principal stations of the Survey, fourteen were 16,000 feet above the level of the sea, and two 18,000—that is, 3252 feet higher than Mont Blanc. Our best thanks are due to the authors of these papers, Captain H. Godwin Austen and Mr. William H. Purdon.

Before quitting the subject of Hindustan, I may bring under your notice the extent of our dominion in that region; and this I do on the authority of Colonel Waugh, the Surveyor-General of India. Our own territory amounts, in round numbers, to 800,000 square miles, and that of our tributaries to 500,000; the aggregate of these sums forming a country six-fold greater than Imperial France, and twelve times the extent of our own islands. You will allow me to congratulate you on the restoration of tranquillity to this vast empire, and the total suppression of an insurrection of unheard-of extent, in which deeds of constancy and valour have been exhibited by our countrymen, and, indeed, also by our countrywomen, which have elevated the national character. We have even already, and within three short years of the Sovereign's direct assumption of the government of our great dependency, evidence of advancing prosperity in the increase of commerce, the great bond which unites peoples to each other. Exclusive of a large trade with other nations, we ourselves received from India, in the last year to which the returns have been completed (1858), merchandise, many articles of which were unknown to our forefathers, to the value of from fifteen to sixteen millions (15,742,528*l.*), an increase in five years' time of above four millions (4,308,117*l.*). Exclusive of eleven millions' worth of gold and silver, we sent the people of India merchandise in the same year to above eighteen millions' worth (18,387,588*l.*), being an increase in five years of near eight millions (7,948,487*l.*), or of 76 per cent. The greater part of our exports consisted of British manufactures of which, half a century ago, it was supposed the Hindus were incapable of becoming consumers.

neighbouring country is very thinly inhabited; but, by a liberal introduction of Chinese emigrants, and sound commercial regulations, Saigon may become a valuable emporium and a convenient harbour of refuge to ships damaged by the storms of the China Sea.

*China.*—In the course of the past year we have had but two communications to add to the large stock supplied to us in the previous one by such eminent contributors as our Associates Sir John Davis, Captain Sherard Osborn, Mr. Laurence Oliphant, and Dr. Macgowan of the U.S. The first of these papers, which we owe to the kindness of one of our Fellows, Mr. Hugh Lindsay, is the diary of Mr. Mickie, kept by him in a voyage from Shanghai to the Gulfs of Pecheli and Laotung. In the course of his paper, this accurate and very intelligent traveller furnishes us with new and valuable information on the hydrography, topography, and climate of the countries he saw. One fact he brings to our knowledge, of which we were but partially informed before, that, through the distracted state of China and the consequent extent of piracy on its coasts, the carrying and coasting trade of the country is in a good measure carried on in European shipping instead of Chinese junks.

The second communication is contained in a letter to Dr. Shaw from Lieutenant Lindesay Brine, R.N., and gives a very instructive account of the Si-kiang or West River, which has been usually called by us the Broadway, and sometimes the Blue River. This stream, hitherto unvisited by Europeans, was found by the expedition under Captain M'Cleverty, R.N., which ascended it in February of last year, to be a broad navigable river to the length of 75 miles.

Respecting the vast empire which has now become so important to us, I shall only state a few broad facts which appear to me of great interest, not only to the geographer but to the statesman. It is well known that a census of the population of China was taken in 1812, which made it in round numbers amount to 360,000,000. Another has recently been taken which raised this large sum to 412,000,000, showing that during forty-eight years the inhabitants of China had increased by 52,000,000—or little short of double our own numbers at the census taken ten years ago. Always closely pressed for the means of subsistence, the people of China are of course at present more so than at any previously known period of their history, and hence the emigration which is going on beyond all precedent with this home-loving people, and this to such remote countries as Australia, California, and even the

Antilles. Her Majesty Queen Victoria has at present in Hong-kong, in her Malayan colonies, and in Australia, not fewer than a quarter of a million of Chinese subjects, among whom are to be found wealthy merchants and large ship-owners.

This singular people, more numerous than all the other people of Asia put together, and in a far larger proportion more ingenious and laborious than the most civilised of them, is so addicted to a commercial intercourse with strangers that they may be truly said to carry it on in despite of their own government—ever, from fear, adverse to foreign intercourse of whatever description. Just now we are at war with China, yet our trade with it goes on as if we were at peace, and such has been the case in all former periods of hostility.

It will be instructive to mention a few prominent facts connected with our commercial intercourse with China. Thirty years ago, our importation of tea, a necessary of life to the whole Anglo-Saxon race, did not exceed 30,000,000 lbs. In 1858, the last year to which the public returns have been made up, it had risen to 75,432,535, of the value of 5,206,618*l.*, and yielding a revenue of 5,186,170*l.* The raw silk with which the Chinese supplied us thirty years ago was a trifle hardly worth recording. On the average of the last three years it was of the value of 4,284,472*l.* In the two articles of cotton and opium, the Chinese take not less than 18,000,000*l.* of our Indian produce, the last of these articles yielding a revenue to the Indian Treasury little short of that which tea yields to the English, with this material advantage, that it is not our own subjects but the Chinese who pay the tax.

The Chinese do not take our own productions and manufactures to the extent that might be expected from so numerous and industrious a people, still our exports to China are on the increase, for in 1858 they had risen to 4,119,573*l.*, exclusive of 6,000,000*l.* of silver, which we were enabled to send by exchanging it for our manufactures and for the gold of Australia, whereas four years before they were no more than 1,505,409*l.*, which shows, even in this short period, an advance of no less than 173 per cent. Altogether, it is computed that no less than 50,000,000*l.* of British capital are engaged in the trade of China.\*

We have also received from our associate, Major W. S. Sherwill, Deputy-Surveyor-General of India, a map of the China coast, from

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\* For other notices on China see Admiralty Surveys.

the Canton River to the Gulf of Pecheli, with a rough outline of the provinces between Canton and Peking. Several valuable remarks and statistical tables are engraved on the map, which is published on a scale of 24 miles to an inch, at Calcutta, Nov., 1859.

*The Indian and Philippine Archipelagos.*—On the subject of the great Indian and Philippine Archipelagos we have received in the past year no communications; but two of our Fellows, Lieutenant De Crespigny, of the Royal Navy, and the eminent naturalist Mr. A. R. Wallace, former contributors of valuable information, are still on this promising field, in which Dutch geographers have in recent years reaped a rich harvest of knowledge. To show that this considerable portion of the globe is of much moment, it will be sufficient that I state a few facts which have been tolerably well ascertained respecting it. The number of its islands and islets has been computed at 6000, the thirty largest of which are computed to have an area of 700,000 square miles, or seven times the extent of Great Britain and Ireland. The Dutch possessions, including tributary States, have been computed to have a population of 17,000,000, the Spanish of 5,000,000, and our own of 250,000, or one-twentieth part of the last of these. But the external commerce of the three nations is in a very different ratio to that of their populations, for our own joint export and import trade last year was 16,430,152*l.*, the Dutch 14,747,414*l.*, and the Spanish but 2,160,000*l.*

*Japan.*—On the subject of this empire, with its computed 30,000,000 of inhabitants, and its considerable but very eccentric civilisation, its climate, sometimes partaking of our own, sometimes of that of the most southern parts of Europe, and sometimes approaching that of Kamschatka, we have in the past year no contributions towards our knowledge. Practically, indeed, we know nothing of this great country beyond having seen a very few of its towns, and a small extent of its highways. Not a man among us has acquired its language; and, in a word, it may safely be asserted that there is no part of the world of equal importance so little known to civilised Europe. It is earnestly to be hoped that a better understanding with the Japanese, than at present exists, will extend the bounds of our knowledge of them and their country.

#### • AUSTRALIA.

The communications made to the Society on the subject of this continent (we have long and justly ceased to call it a mere island) have been most important. They in fact embrace great

practical discoveries of new and available territory. In the prosecution of these discoveries, what Mr. Burke calls "the dexterous and firm sagacity of English enterprise" has never been more eminently displayed. Among the most eager of Australian discoverers must be ranked His Excellency Sir Richard Macdonnell, the Governor of South Australia, who in his own person gives a signal example of the precepts he lays down for the conduct of the subordinate officers of his government. We are indebted to the courtesy and geographical zeal of the Secretary for the Colonies for Sir Richard's public despatches, and from these, and an interesting private letter of his own addressed to my predecessor, we have an account of one of his journeys. In the course of this expedition, which extended over seventy-seven days, he rode 1800 miles, penetrating the continent to the 28° of latitude, bivouacking at night, and seeking shelter in the day from a heat sometimes reaching 115° of the thermometer, under the scanty shade of a few branches of the scrub.

Under the auspices of Sir Richard Macdonnell, Mr. William Randell performed last year the most remarkable achievement in steam navigation which has yet been accomplished on the Australian continent. This consisted in a voyage on the Darling, extending by the windings of the river to 2400 miles from the sea, and to 1800 reckoning from the junction of the Darling and Murray. The Darling in its long course has but a single fall of about 8 feet in several hundred yards, an obstruction to its navigation only when its waters are at the lowest; so that we have here a great water way into the interior of the continent, and already on the fertile banks of the Darling many runs have been established.

Mr. Macdougall Stuart, whose discovery of a well watered country in Southern Australia, equal in area to half that of Ireland, was brought to our knowledge last year, is, by the most recent accounts, prosecuting new discoveries with the hardy intrepidity which characterised his previous one, and which called for the marked approbation of our Society, and the substantial reward of the local Government.\*

The coasting charts, twelve in number, on various scales, published by the Trinity House, Adelaide, under the superintendence of B. Douglas, Esq., and accompanied by sailing directions, will be duly appreciated by mariners visiting those parts of Australia.

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\* Through the Duke of Newcastle, H.M. Secretary for the Colonies, a gold watch was forwarded to Mr. Stuart from this Society.



On the north-eastern side of the continent, and towards the southern limits of the new government of Queensland, a very important discovery has been made, consisting of a capacious harbour sheltered from every wind. The territory within which this harbour exists is on the eastern slopes of the Australian Alps, and is therefore probably well watered, which is equivalent to its being fertile, since it lies close to the Tropic. Should this turn out to be the case, it will most likely be found well adapted to the growth of cotton, the sugar cane, and even coffee. In this event an abundance of suitable labour only will be wanting, which can be supplied by a liberal importation of Chinese immigrants. By favour of the Duke of Newcastle, the despatch of His Excellency Sir George F. Bowen, F.R.G.S., describing the new harbour, has been furnished to us.

The map of the colony of Queensland, by Mr. L. F. Landsberg, extending from the parallel of 22° S. to 28° S., and to about 5° from the coast, exhibits considerable detail.

The map of Tasmania, in four sheets—scale  $\frac{1}{81,800}$ , or about 5 miles to an inch, by James Sprent, Esq., Surveyor-General—is coloured to distinguish the counties, gives soundings, and is apparently the largest and best map published.

This sketch of Australian discoveries in the course of the past year would be imperfect if I were to pass unnoticed the perspicuous and popular explanation which, at two meetings of the Society, was given of this continent by Professor Jukes, derived from his own personal experience and long meditation. He clearly pointed out the source of that general character of drought which we know, from our seventy years' experience of it, belongs to the Australian land, and he indicated the causes which in particular localities tended to mitigate it. From the Professor's account we shall probably be led to the conclusion that the common belief that the great mass of the interior of the continent is but an arid desert, is well founded.

But even allowing such to be the case, still a vast amount of land remains for human use, and by good fortune it has so happened that we have hit at once on the best parts of the country. To judge by our experience of it, Australia may, as it appears to me, be described as a country of great drought, but at the same time, and probably arising from this very drought, a country of eminent salubrity, far exceeding in this respect every other colony founded by the nations of Europe. Not only does the European thrive in

a country not made for him, but to judge by the experience of three generations, he continues to thrive without the smallest appearance of degeneracy.

Besides this it may be said, that not only does the European thrive in the soil and climate of Australia, but all the animals which he had domesticated in Europe equally do so. For one of these animals, the sheep, Australia is better fitted than any other colony ever founded by the European race, and this country, with the exception of its intertropical portion, may be designated as an eminently pastoral one. For strictly agricultural purposes it is obviously less suited, for while it exports wool it imports corn.

The mineral wealth of Australia is remarkable, although as yet its development has but commenced. Independent of its iron and coal, it produces gold, silver, copper, tin, and lead ores, which are extensively imported into England.

Under the shield of the parent country, and in the enjoyment of the liberty which we ourselves possess, the Australian Colonies have made a progress of which there is hardly an example. Five small colonies, which ten years ago had between them a population not exceeding 400,000, contain now more than a million of people. They furnish us every year, and have been doing so for the last seven years, with 10,000,000*l.* worth of gold, with above 10,000 tons of copper, tin, and lead ore, and to the value of near four millions and a half of wool and tallow, while of British merchandise they consume above eleven millions and a half's worth, or at the average rate of 11*l.* 10*s.* for every colonist,—incontestable evidence of their value to us, as well as of their own prosperity.

#### EUROPE.

*Russia.*—After mentioning the labours of our own countrymen in various directions, I could scarcely speak of any more interesting than those of Russia. Her fields of research are so vast as to be almost inexhaustible; and year by year she solves the mysteries of some remote *terra incognita*, and accelerates the progress of geographical science. A successful war places at her disposal the treasures of the Caucasus, while, under the auspices of peace, her merchants and men of science carry the influence and civilization of their country to the confines of China and the base of the *Himálayas*, across a region of historic and scientific interest.

To the recent researches of Russian geographers we are indebted

for our present knowledge of one of the finest rivers of the world—the Amúr, which M.M. Peschurof, Permikin, Raddé, and other pioneers have so minutely described. Their narratives, translated for us by Mr. T. Michell, appear in an English garb in our Transactions for 1859, accompanied by an excellent map by Mr. Arrowsmith. With these, our knowledge of the Amúr is pretty complete; but much interesting matter will yet be furnished by the exploration still pursued, and by translations from other Russian accounts. Mr. Maak's work on the Amúr, alluded to by my predecessor in this chair at our last annual meeting, has been published at St. Petersburg, together with a map by M. Samokhvalof.

But I would more particularly draw your attention to Central Asia, as a country of permanent interest to every lover of geographical science. Since the days of Czomo de Koroës, the celebrated Majar, of our lamented Moorcroft and Trebeck, and of Wolf and Atkinson, much light has been thrown by Russian travellers on the Steppes of Turkestan.

The most recent scientific traveller in Central Asia is Captain Golubëf, of the Imperial Staff, who in 1859 explored the western part of the country between the Tian-shan and Alataú chains and the low valley of Lake Balkhash. That tract of country embraces the Semirechni (Seven Rivers) and Trans-ilian districts of the Russian Empire, and the provinces of Ili and Tarbagatai, appertaining to China; and while it is one of the regions of Central Asia least known to geographers, it is also one of the most interesting, forming, as it does, the boundary between the elevated plateaux of Asia and the Steppes, which extend from the Caspian to the lake of Balkhash.

The farthest point beyond the Russian frontier determined by Captain Golubëf, was the Budhist Monastery of Sumbé, which no European traveller had yet visited. The hypsometrical observations made by this gentleman are of the highest value. He has, for instance, ascertained that the extensive lake of Issyk-kul, the most central point of Asia, situated between the Tian-Shan and Trans-ilian Alataú ranges, has an absolute elevation of about 5000 feet; while Fort Vernoe, a modern Russian fortification, about 55 miles to the northward, lies 2700 feet below the level of the lake.

A memoir on the Russian trade with Central Asia was read at the last meeting of the British Association for the Advancement of Science by our associate, Mr. Michell, whose intimacy with the Russian language has enabled him to consult the most recent

and authentic data in connection with the subject. He introduced to our notice a valuable work on Central Asia by M. P. Nebolsin, a Fellow of the Imperial Geographical Society of Russia, from which Mr. Michell has drawn many particulars relative to the social condition and requirements of the country east of the Caspian. It appears that between 1849 and 1857, the exports of Russia to Bukhára, Khiva, and Kokán had increased 78 per cent., and the imports from those countries 104 per cent.

The Khorassan Expedition, under M. Khanikof, has returned to Russia with much valuable information. M. Lentz and other members of the expedition have communicated to the Imperial Geographical Society the outlines of their labours in Persia and Afghanistan, but the general result of their explorations has not yet been laid before the public.

As M. Khanikof is shortly to appear among us, I have no wish to anticipate the valuable report which he probably will furnish. I may, however, say generally, that his researches are supposed to have been of the greatest importance to science. With regard to geography, in particular, our maps of Persia are threatened with considerable alterations, the expedition having frequently proved their incorrectness. Many towns depicted on modern maps have no existence, and the town of Tebbès—to mention one instance out of many—will have to be removed a degree and a half to the westward and a degree to the southward. According to the '*Compte Rendu*' for 1859, no less than 100 points were determined astronomically by the expedition, and its explorations embraced 10 degrees of longitude and 13 of latitude.

The inquiry into the practicability of establishing a navigable water-way between the Caspian and Azof Seas has been revived. This project is of great antiquity, having been contemplated by Sultan Selim II., about the year 1570, and subsequently by Peter the Great, who, in 1697, caused works to be commenced with the object of establishing a communication between the Volga and the Don. These were, however, discontinued in 1701, and to this day the Don is the only great river in Russia unconnected with any other. Explorations were also made in 1831 and 1846 to ascertain the practicability of effecting the desired junction by means of the Kurá, but they appear to have revealed insurmountable obstacles.

Dr. Bergsträsser, of St. Petersburg, is now engaged in inquiring into the possibility of uniting the Caspian and Azof, by improving the water-way which now partially connects those seas. A very

extensive depression or valley, supposed to have been formed by the disjunction of the Black and Caspian Seas on the upheaval of the Caucasian chain, runs along the isthmus between the Azof and Caspian. Two distinct streams, severally called the Eastern and Western Manych, occur in this valley. Their water-parting is formed by the anticlinal axis of the country, at about 170 miles west of the Caspian, and which rises to an elevation of 107 feet above the Caspian and 23 feet above the Euxine.

The river Kaláns, coming down from the lower range of the Caucasus, disembogues a little to the west of this watershed into the Manych valley, and its waters principally flow off to the Eastern Manych, causing a very rapid current.

In spring, the Eastern and Western Manych are united at their sources by a shallow lake, called Shara-Hulusun; but this lake is not even navigable by boats. It is at this spot that Dr. Bergsträsser suggests the construction of an immense reservoir or lock. The Eastern Manych flows on within 47 miles of the Caspian, occasionally spreading out in shallow inundations and lakes; and in spring and autumn its waters find their way to the Caspian, in conjunction with those of the Kumà.\* It terminates in a lake which was once apparently connected with the Caspian, for a river-bed, in some parts filled with drifted sand, extends from it towards the sea, and the waters of the Caspian still ascend it for a certain distance on the prevalence of south-easterly winds. Dr. Bergsträsser considers that this river-bed might be cleared at a very small expense, and that, by removing the artificial obstructions by which a great portion of the Kumà and Manych waters is now deflected towards the pasturages of wandering tribes, and by collecting those waters within a single bed of no very great breadth, a navigable stream will be easily produced, available for steamers and vessels of war.

Before I quit this subject, let me express the regret with which we have heard of Mr. Lamansky's resignation of office as Secretary of the Imperial Geographical Society of Russia. The science we pursue, owes much to the indefatigable exertions of that gentleman, and is especially indebted to him for much valuable assistance and co-operation. Mr. Theodore Thörner has been elected in his stead, and will doubtless prove a very worthy successor.

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\* The western Manych was navigated in 1859 by a boat-party from its water-parting to the Sea of Azof. An account of this voyage is given in a Memoir by Dr. Bergsträsser, who urges a further scientific survey of the Manych valley. See 'Morskoi Sbornik' for October, 1859.

Nor should I omit the geographical and statistical descriptions of Russia recently published in the new edition of the 'Encyclopædia Britannica.' I have the greater pleasure in drawing your attention to this article, since it is the production of our countryman—Professor Bishop of St. Petersburg.

*Sweden and Norway.*—The Expedition to the Polar Seas, proposed by the Swedish Government, has already been mentioned, but we have had to acknowledge with thanks the receipt of the useful maps and charts of Sweden and Norway, which continue to be regularly sent to us from those countries. Among the latest of these may be noticed the map of the province of Göthaborg in two sheets, scale about three miles to an inch, and executed in the same clear style as the previously published maps of the provinces of Carlskrona, Skaraborg, &c.

*Denmark.*—Captain Rhode, the Hydrographer of Denmark, has published an excellent chart of the north part of the Cattegat, of which the southern part will also soon appear.

The Royal Society of Northern Antiquaries of Denmark, under the able guidance of its Secretary, our learned Associate, Professor C. C. Rafn, continues the publications of its useful historical Annals and Memoirs.

From our Corresponding member, Captain C. Irminger, of the Royal Danish Navy, we learn with pleasure that Carl Petersen, the steady and trustworthy companion of Penny, Kane, Hayes, and McClintock, who had last year received from his Sovereign, the King of Denmark, the silver cross of Dannebrog, for his services in Greenland and the Arctic Regions, has since been gratified by the appointment of Inspector to the Lighthouse on the Island of "Hjelm" in the Cattegat, about 3 miles from the east coast of Jutland.

*Germany.*—A map of Frankfort, in 16 sheets, is engraved on the scale of  $\frac{1}{12500}$  or about 4 feet to the mile, by A. Ravenstein, and deservedly ranks with any of the continental-city monographs.

Four elaborately tinted maps of the late Major A. Papen's Atlas of Central Europe, by A. Ravenstein, have been added to the five previously published, and the remaining three may be shortly expected.

*Prussia.*—Of the topographical map of Prussia, 10 sheets have been published this year, including portions of Thuringia. The Prussian Admiralty have published a chart of the estuaries of the Jade, Weser, and Elbe, in 6 sheets.

*Austria*.—A map of Dalmatia is near completion, as also one of Hungary and Galicia.

*Turkey*.—A map in 6 sheets, scale  $\frac{1}{333,600}$ , of Wallachia, is at present being engraved at the Military Geographical Institute of Vienna: it is a reduction of the survey made by the Austrian officers in 1856-7.

From Major J. Stokes, R.E., we have received an important paper, accompanied by a map, on which is marked with great precision the present state of the mouths of the Danube, with off-shore soundings. The writer compares this map with others of earlier date, and clearly shows how the various delta has been formed; how some passages have been silted up, and the deep-water channels opened out in other directions; that the débris of the soil, brought down the river at different periods from the interior, is first deposited on the coast, shoaling thus the water around the various mouths, until, by the accumulation of strata upon strata, it appears above water, through which the river forces its way, forming islands with tortuous channels, and the whole coast-line is gradually carried seaward.

*Holland*.—Six sheets have this year been added to the large map of Holland, on the scale  $\frac{1}{333,600}$  or  $1\frac{1}{6}$  inch to the mile, making 24 sheets published out of 62, of which the map will consist when complete.\*

*Belgium*.—Since our last anniversary, several excellent maps have been received from Belgium, especially those by our associate, M. Vander Maelen; of which the principal are, the provinces of Brabant, Hainault, Liège, Luxemburg, and Namur: all of these maps are on the scale of  $1\frac{1}{2}$  inch to a mile, and are well adapted for the use of travellers, as they exhibit the various railways, roads, and water communications.

*France*.—During the past year the hydrographic surveyors, under the late eminent engineer, M. Vincendon Dumoulin, have been employed on the coasts of Spain, Sardinia, and the west coast of Italy, and several sheets of these surveys have been published by the Dépôt de la Marine.

Of Spain, the south-west coast has been completed; of Sardinia, two sheets of the coast between Nice and Genoa have been published, which completes the survey of the coast of Liguria, under the direction of M. Daroudeans, who has also surveyed and published a beautiful chart of the Lipari Isles.

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\* See also page cxviii.

Of the west coast of Italy, the survey has reached the Bay of Salerno; charts have been published as far as the mouth of the Tiber: several sheets are far advanced in the hands of the engravers, which will appear in the course of the present year, and will include the Ponza Islands and the Straits of Messina.

The coast extending from near Amalfi, in the Bay of Salerno, to Montelcone in Calabria, has not been examined. For other accounts of the proceedings of French geographers I must refer you to the very full statement contained in the excellent report of our sister Institution, the Geographical Society of Paris.

We have also received 56 charts published by the *Dépôt de la Marine*, which have been incorporated in that valuable series.

*Sardinia*.—Three sheets of the large map of Sardinia have been added to our collections during the past year, making 78 sheets already published out of 91, of which the map is to consist.

*Switzerland*.—The Great Federal Map, as we are informed by our learned associate, Professor Paul Chaix, of Geneva, commenced about the close of the last century (1791) by Trelles of Berne, is nearly complete.\* It is engraved on 25 sheets; the scale is  $\frac{1}{100,000}$ , or  $1\frac{1}{2}$  inch to a mile.

Teer, the astronomer of Zürich, assisted by M. Sistalozzi and Professor Trechsel, conducted the survey to the year 1811, measured two base-lines and carried the triangulation over the cantons of Zürich, St. Gall, Appenzell, Thurgau, and the southern cantons.

In 1822 General Finsler surveyed the districts of Sargans (St. Gall), and conducted the survey until 1832, when it was considered necessary to connect the Swiss triangles with those of other countries, and especially with the Austrian survey.

In 1833 General Dufour succeeded M. Wurstenberger, and held a conference, at which it was determined that the map should be engraved on 25 sheets, each sheet 70 centimetres long and 48 broad, on a scale of  $\frac{1}{100,000}$  of nature, corresponding to an area of 70,000 metres by 48,000 metres.

The Government of Lucerne has decided on engraving that canton, on a scale of  $\frac{1}{25,000}$  or about 2·8 inches to a mile. The Canton of Glarus will be issued in about a year on a scale of  $\frac{1}{25,000}$ , but I regret to be informed that the Canton of Schaffhausen is not to be published as part of the Federal Map.

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\* The only sheet wanting (1860) is No. 13, and small portions of Nos. 8, 22, 23.



Among new maps are a geological map of Aargaurian Tura, by Casimle Mösch, scale  $1\frac{1}{2}$  inch to a mile; and a geological map of the eastern part of the Grisons, by Professor Theobald, scale  $\frac{1}{70}$  of an inch to a mile.

Professor O. Heer has published his "*Flora Tertiaria Helvetiæ*," in three vols., which our Associate, Professor J. M. Ziegler, has presented to the Society.

M. Studer has given some very interesting observations at Berne and its environs.

#### RECENT PUBLICATIONS.

*Atlases.*—The Royal Illustrated Atlas, by Messrs. Fullarton and Co., has reached its 20th part, and continues to merit the approval already bestowed upon it. The geographical notice attached to this Atlas renders it of value to the scholar.

Blackie and Son's Imperial Atlas is finished, and the parts containing the maps are published. The alphabetical index, containing 120,000 names, is now complete, and also exhibits great care and attention to detail in its valuable list of geographical positions.

The Royal Atlas, by A. K. Johnston, so well described by my predecessor in his Address of last year, steadily progresses. The 5th part, making in all 25 maps beautifully engraved, with an alphabetical index to each sheet, has been published, and comprises about half the atlas, which will be completed early in 1861. The hydrographical portion of each map being printed in blue ink, a single glance enables us to form an estimate of the relative proportion of land and water, in which particular it is in advance of its contemporaries. A new edition of the Geographical Dictionary and of the School General Atlas will be issued shortly. Of the series of large wall maps, noticed in the President's Address of 1858, Europe and Australia are published by Mr. Stanford; and Asia, Africa, North and South America, are constructed and in progress, Asia and North America being well advanced.

The distribution of maps, by a paper of so large a circulation as the '*Dispatch*,' must tend materially to popularize geography. The maps, chiefly the production of some of our own members, are before us, and you will see that they form as comprehensive and cheap an Atlas as was ever produced.

*Ceylon.*—Since our last anniversary, Sir Emerson Tennent's elaborate work on Ceylon, published by Messrs. Longman, has appeared. The author has carefully examined into the physical geography,

the geology, the vegetable productions, the mineralogy, the zoology, and the natural history of the island, and to almost all these branches of science something new is added. The narrative, moreover, exhibits the state of Ceylon from the earliest antiquity. The work is illustrated by numerous maps, plans, charts, and drawings, and contains ample details of the form of government in the island, its revenues and expenditure, together with the principal sources of trade, especially the cultivation and export of *cinnamon*, and the more recent and eminently successful experiment of planting *coffee* on a grand scale.

*New Zealand*.\*—Dr. Thompson is already known to us by his memoir on the “stature, bodily weight, &c., of the New Zealand race of men,” read before this Society in 1852, and his present work is the result of an extended acquaintance with the regions in question. It is divided into three parts: the *first* gives a résumé of the physical features of the country and of the native inhabitants,—their laws, religion, warlike and other customs, their food and husbandry, their literature and domestic life; the *second* traces the various stages of European interference down to the present time; the *third* discusses the questions of their decrease and of the prospect of their future continuance.

*Sources of the Nile*.—Our Medallist Dr. Beke has resumed his pen and given us a volume, entitled “The Sources of the Nile, being a General Survey of the Basin of that River and of its Head-Streams, with the History of Nilotic Discovery,” illustrated by a series of maps. Thirteen years have elapsed since we published two papers by Dr. Beke “On the Nile and its Tributaries.” The whole has, however, been remodelled, and many important particulars are now published for the first time, by Mr. Madden.

*China and Japan*.—The “Narrative of the Earl of Elgin’s Mission to China and Japan in the years 1857-58-59,” by our associate, Laurence Oliphant, has been published since the last Anniversary, by Messrs. Blackwood. Mr. Oliphant furnishes us also with a concise account of his excursion to the Malay Peninsula, to which he was transferred in Malay sampans and hospitably received, and of his visit to the Philippine Islands. The first volume contains a lively and clear description of the various parts of China visited by the mission, with an account of the trade, manufactures, &c., of the people, and particularly of the ascent of the Yang-tse-Kiang

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\* “The Story of New Zealand, Past and Present, Savage and Civilized.” By A. S. Thompson, M.D. 2 vols. Published by Mr. J. Murray.

in H.M.S. *Furious*, commanded by Captain Sherard Osborn, R.N., F.R.G.S., an account of which will appear in the 30th volume of our Journal. The second volume treats of Japan and of the country and inhabitants generally, and abounds with interesting information with regard to that little known empire.

*Siberia*.—I have just been informed that our associate, Mr. Atkinson, so well known for his extensive travels in Russia, is shortly to publish a second work on Siberia.

*Eastern Africa*.—Consul M'Leod's "Eastern Africa, with the Narrative of a Residence at Mozambique," in 2 vols. Messrs. Hurst and Blackett.

Slowly but increasingly of late years the attention of Europeans has been drawn to the immense resources of Eastern Africa and the importance of redeeming that prolific region and its swarming inhabitants from the curse under which they are laid by the slave-trade. The Portuguese claim possession of the coast from the town of Lourenço Marques on the northern side of Delagoa Bay, to Cape Delgado. Within this range of 15° of latitude lie the mouths of the Zambesi where Dr. Livingstone is now pursuing his heroic enterprise, and southward, just within the Portuguese limits, the mouth of the navigable river Mouakuse, supposed to be continuous with the Limpopo, which forms the northern limit of the Transvaal Republic. Between the two rivers lie the Sofala river, town and territory which Mr. M'Leod identifies with the Ophir of Scripture.

This work, besides giving a statement of the Portuguese settlements in East Africa, supplies valuable information relative to the African dominions of the Imám of Muskat, the island of Madagascar, and the other islands of the Ethiopian Archipelago. The last portion of the work enters fully into the commercial resources of Eastern Africa.

The Travels, Researches, and Missionary Labours of the Rev. L. Krapf have been published by MM. Trübner and Co., and include also the journeys of the Rev. J. Rebmann and the Views on the Resources of the Wanika, by the Rev. J. Erhardt. To these is prefixed an account, by Mr. E. J. Ravenstein, F.R.G.S., of Geographical Discovery in Eastern Africa.

*Manual of Geography*.—The best testimony to the merits of Mr. W. Hughes's Manual of Geography is supplied by the fact of the numerous editions which have been successively called for within a recent period. The leading idea which its author has sought to embody in this volume, is the connection of physical geography with the indus-

trial pursuits and social condition of nations, or, in other words, the *geography* of industry and commerce, viewed as dependent upon the natural features, climate, and productions of the various regions of the earth.

*Encyclopædia Britannica*.—The *Eighth Edition* of this great work is in course of publication by Messrs. Adam and Charles Black of Edinburgh, and is nearly completed. It will comprise twenty-two quarto volumes, illustrated by upwards of five thousand engravings on wood and steel. The articles have been carefully revised and carried up to date, and a reference to the list of the principal contributors is sufficient to stamp the value of the work.

*New Granada, Equador, Peru, Chile, etc.*, by Mr. Wm. Bollaert, F.R.G.S.—This work, dedicated to Sir Roderick I. Murchison, will shortly appear. The author is already known to us by his papers published in our Transactions.

*Ruins of Carthage*.—Mr. Davis has been engaged since 1856 in excavating the ruins of ancient Carthage and Utica, and the objects of antiquity he has discovered are now being arranged in the British Museum. At the close of his excavations he visited the sites of other ancient cities.

*Map-Projections, etc.*—We have received two map-projections, one by Sir John Herschel, the other by Col. Sir H. James. Also an interesting paper on a method of observing the lunar distance, by Col. G. Everest. These will be printed in our Journal.

*Great-Circle Sailing*.—Two mechanical methods of solving problems in great-circle sailing have been published. One by Captain W. C. Bergen, of the mercantile marine, is by charts of the gnomonic projection. This method is considered by Mr. J. W. Share, R.N., to be the most satisfactory, expeditious, and accurate of all the mechanical methods that have been hitherto devised. A *straight line* ruled across any part of these charts represents the arc of a great circle.—The other by Capt. Berger, also of the mercantile marine, is termed the "Patent Sphereometer," invented for the purpose of obviating all abstruse calculations in great-circle sailing. It consists of a hollow hemisphere of wood, coated over with a slaty composition, on which are marked only the parallels and meridians: a graduated, moveable brass meridian serves to measure the distance between the two places. The various courses are ascertained by a brass protractor, fitted to the sphere.

*Star Maps*.—A new edition of the six maps of the stars on the gnomonic projection, designed and constructed by Sir J. W. Lub-

bock, and published in 1844, under the superintendence of the Society for the Diffusion of Useful Knowledge. This new series is edited by Mr. Charles O. Dayman, A.M., and contains all the objects in Vice-Admiral Smyth's cycle.

An atlas will shortly be published, containing four maps of the stars and two maps of the world, on Sir Henry James's geometrical projection of two-thirds of the sphere; with a table, for the construction of maps on this projection, on any scale that may be required. The celestial maps on this projection possess the peculiar advantage of presenting at one view the two poles and all the circumpolar stars within  $47^{\circ}$  of one pole, and all those within  $125^{\circ}$  of the central meridian.

Finally, it affords me great pleasure to notice the successful progress of this Society during the past years, which has been the subject of comment in the several Council Reports submitted to the Fellows at the Anniversary meetings, and may be seen at once by comparing the income, which amounted, ten years ago, to only 778*l.*, while in 1859 it reached 3471*l.* During the above period, 3000*l.* has been expended on the Library and Map-Rooms, and furniture and fittings, besides which a sum of 2500*l.* has been added to the Permanent Fund.

The result of these ten years may be thus briefly stated:—The collections in the Library and Map-Rooms have more than *doubled*, the number of Fellows has more than *trebled*, and the income has increased *five-fold*. In 1849 the revenue admitted of an outlay of less than 100*l.* on publications; in 1859 it warranted an expenditure of little short of 1000*l.*

Sincerely do I congratulate you on this state of your affairs. The progress of the Society of late years has been rapid, but at the same time steady and continuous. Our increasing numbers, the large attendance at our meetings, the character of the communications which we receive,—all tend to prove that the labours of the Society are widely recognised and appreciated. And, as it seems to me, it ought to be so; for I know no country in the world to which the results of geographical investigation are calculated to be of greater value than they are to England. With an empire that extends to every quarter of the globe, and embraces within its rule almost every variety of the human race, and with a commerce that fills every sea and occupies every port, the English have, perhaps,

more to gain from the prosecution of geographical science than any other nation ; and the researches of geographers are no less important to our statesmen and our merchants, than to our men of science themselves. I feel, therefore, no doubt that our recent prosperity will still be continued and extended, if we bear in mind that, while the spread of science is our first object, it is also our duty to render the knowledge we acquire and store up as available as possible for the general information of our countrymen. I believe that our readiness to do this has added much to the popularity, as I am confident that it has greatly increased the usefulness of the Royal Geographical Society.

Now, gentlemen, it only remains for me in concluding this Address to resign into your hands the honourable post to which you were pleased to call me a year ago. The usual custom would, I believe, under ordinary circumstances have justified me in hoping to be permitted to occupy this chair for another year. But I thought it right some time ago to intimate to the Council that I should feel it my duty to resign the office of President at the termination of the first year. When I was elected last May I had every reason to believe that I should be able to devote ample time to the discharge of the duties of your President, and at least to do my best to serve the Society in the high position in which they had placed me. But, as I am only too keenly conscious, this has not been the case. Having been called very shortly after my election to fill a laborious and important office in the Government, it has been impossible for me to give that attention to the affairs of the Society, which it would otherwise have been a great pleasure to me to have afforded ; and if the Society's interests have not suffered in consequence, it has been due only to the efforts of my colleagues on the Council, who I fear at much personal inconvenience have most considerately and efficiently supplied my place. Under these circumstances I could not hesitate a moment as to the course which I ought to take. I was aware last year when I entered upon this office how little fit I was to fill it ; I knew that I owed the honour of your choice far more to your grateful recollection of your first President than to any personal qualification of my own ; but I hoped to be able to prove my gratitude to you by a zealous devotion to the interests and business of the Society. When that became impossible to me, my own inclination would have prompted me to have tendered you my resignation at once ; but, as I understood that such a course would not be convenient to the Society, I have

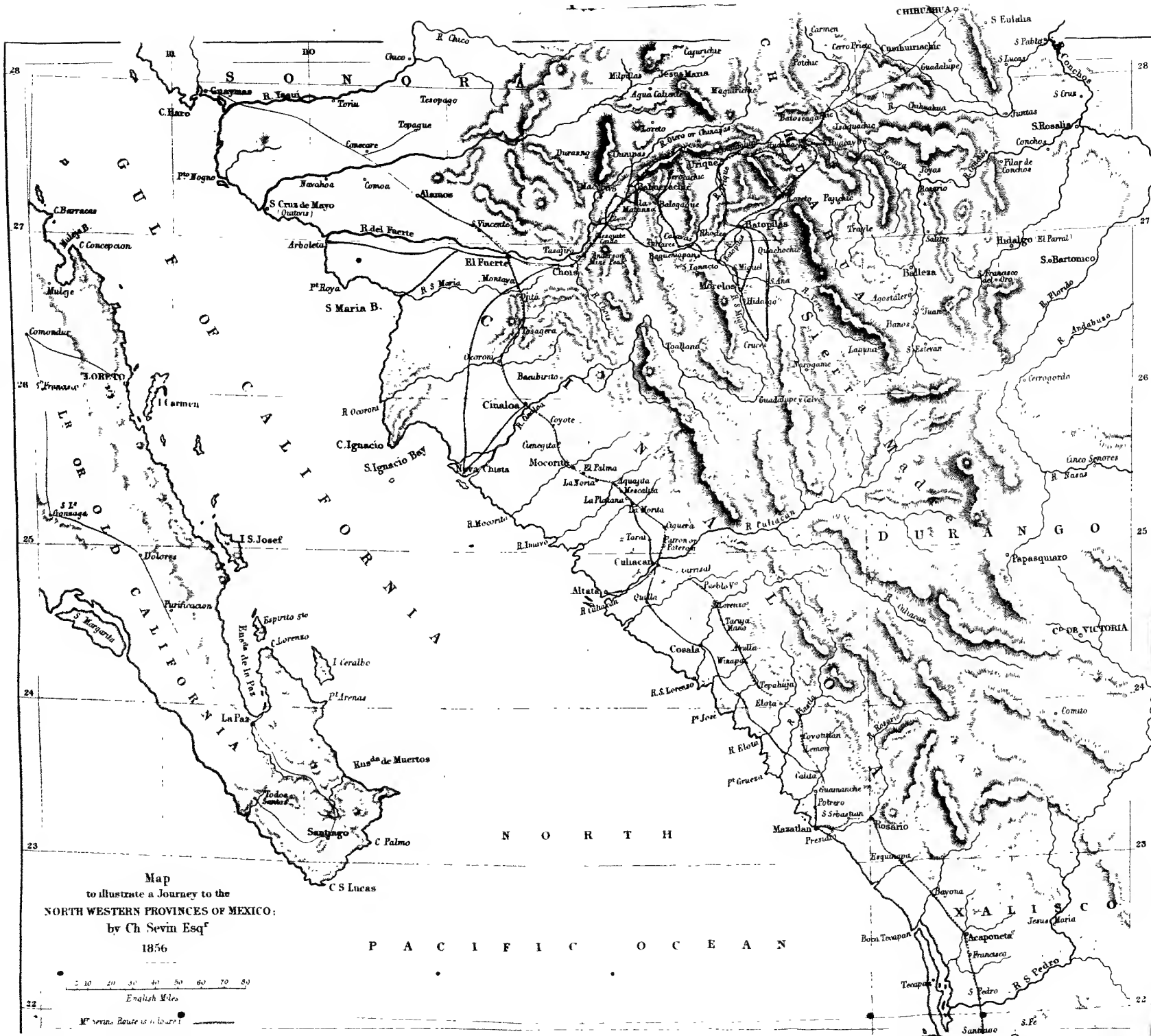
waited until the return of the usual period of election has enabled me to retire from my office without disturbance to our ordinary arrangements. I shall, gentlemen, ever feel sincerely grateful to you for the forbearance with which you endured my shortcomings, and for the kindness which you have ever shown me. To the members of the Council my warmest thanks are due for the never-failing readiness with which they have taken upon themselves the various duties which I have been compelled to neglect. The same friendship which led Sir R. I. Murchison to support my election as his successor last year, has induced him to act for me on numerous occasions with a kindliness which I shall never forget, and which has enabled me to feel that my forced absence from many of your meetings, however disagreeable to myself, has often been in reality a gain to you by placing him in the chair. Let me also here avail myself of the opportunity of returning my best thanks to Dr. Norton Shaw, for the zealous and able assistance which he has always afforded me.

Gentlemen, it is a great satisfaction to me to know that I shall be followed in this chair by one so well able to discharge all its duties, as my friend Lord Ashburton. His varied knowledge, his love of science, and his eminent personal qualities render him admirably fitted for the post to which he has been elected; and in resigning to him the office which I have so inadequately filled, it is to me a source of much gratification to feel assured that the interests of this Society are about to be entrusted to one who is so well qualified to promote that, which must ever be of high importance to me,—the prosperity of the Royal Geographical Society of London.

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PAPERS READ  
BEFORE THE  
ROYAL GEOGRAPHICAL SOCIETY.

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I.—*Journey to Mexico.* By CH. SEVIN, Esq., F.R.G.S.

*Read, January 24, 1859.*

ON the 3rd day of May, 1856, I started, in the mail steamer *Asia*, from Liverpool to New York, on my journey to the North-Western Provinces of Mexico, to examine the different copper and silver-mines, and to ascertain how far the mineral wealth of these regions can be worked to advantage with English capital. I was accompanied by Mr. R. S. Hichens, of Redruth, a gentleman of great experience in mining and assaying, and by Mr. Schahl, who had been in the country before.

We arrived at New York on the 16th, at 4 A.M., and after a short stay, took our passage in the West India steamer *George Law* for Aspinwall, which we reached on Saturday, the 31st of May, at 6 A.M., after a stay of about twelve hours in Kingston, Jamaica. We landed at 11 o'clock, and took our departure by the railway over the Isthmus to the old town of Panama, where we embarked shortly after our arrival in a small ferry-steamer, to be conveyed to the great steamship *Golden Gate*, lying off the port, under the shelter of an island at a distance of 5 miles.

We had about 850 passengers on board the *George Law*, and were joined by 100 other passengers, who had arrived the day before by the mail-steamer from New Orleans. Unfortunately, the Californian mail-steamer had ceased to call at the intermediate port of Mazatlan, and touched only at Acapulco, for coaling. We were therefore compelled to go on to San Francisco, and return in a sailing vessel to Mazatlan. The accommodation by the *Golden Gate* was superior to that of the *George Law*, but still far behind the comfort on board the fine Cunard steamer, as regards berth and table. The *Golden Gate* is a vessel of great speed and very large tonnage, with a fine double deck on the after part of the vessel, affording a nice space for walking to the first and second-cabin passengers.

We left Panama on the 1st of June, at 7 P.M., and had a fine passage with very hot weather until we reached the Cape St. Lucas,

when the north-western breezes set slightly in, and the light dress hitherto worn was changed for warm clothing. On Sunday the 15th of June, at 10 A.M., we arrived in the large and beautiful harbour of San Francisco, and landed without undergoing any examination of luggage or other similar annoyances. We soon found a vessel named the *Cornelia*, Capt. Nye, which was advertised to sail for Mazatlan in a fortnight or three weeks. It was a small schooner of 120 tons, with very limited accommodation for first-class passengers; but the captain, an American, was exceedingly kind and agreeable, and greatly contributed to make our journey in such a small craft a little more endurable.

In order to make the most of our time during our stay in San Francisco, we took firstly all such information as was interesting for our journey to Mazatlan; and after seeing every part of the town and neighbourhood, we started by coach for Santa Clara, and thence to the quicksilver-mines of New Almaden, where we remained two days, and were most kindly received by Mr. Young, the principal director, who gave us very interesting information as to the quicksilver-mines and smelting-works, which turn out the immense quantity of 40,000 flasks of quicksilver every year: these mines being so abundant in rich cinnabar ore that their working is limited to the demand and consumption of this indispensable article of trade. Mr. Young also gave us an account of the silver and copper mines in Sonora and Cinaloa, which provinces he had repeatedly visited. We returned by way of the beautiful valley of San José, and by steam from Alviso, a little port at the southern end of the bay, to San Francisco. The following day we set out on a trip up the Sacramento River, in the fine steamer *Antelope*; passed the town of Benicia, with its large factories and works for the construction and repairs of the Californian mail-steamers, and arrived at Sacramento town. From this place we made excursions by railroad to Folsom, towards the Sierra Nevada, to Placerville, El Dorado, Nevada city, and Grass Valley. We returned by steam from Marysville to San Francisco, after having made a trip of upwards of 500 miles, investigated the different gold-mines, and the manner of gold-washing in rivers, quartz-crushing, tunnelling, hydraulic-washing, &c.

According to what we saw, there is no doubt that gold exists in almost unlimited quantities in the mountains and out-branches of the great chain of the Sierra Madre, and that, by degrees, the extraction will be carried out on a better or more practical principle, and will form, when once well regulated, an important branch of industry in the provinces of California and Mexico.

After completing our purchase of provisions, we embarked on the 2nd of July for Mazatlan.

On Monday the 21st July, 1856, we arrived at Mazatlan, in twenty-one days from San Francisco. We anchored outside the bay, at a distance of about 3 miles from the town, which we reached in small boats, out of which we were carried on the backs of half-naked Mexican cargadores. We got on shore at 9 A.M., and, with the assistance of a clerk of the house of Messrs. Ballingall, Thomson, and Co., we were enabled to clear our luggage through the custom-house without paying duty on our tea and provisions. We proceeded at once to the only hotel in the place, kept by a Frenchman, after paying about 10 dollars for boat hire and conveyance of our goods to the hotel.

The town and harbour of Mazatlan is at a distance of about 15 leagues from the great Cordillera or Sierra Madre, situated in  $23^{\circ} 10'$  lat., and  $106^{\circ} 21'$  long. It has a very picturesque appearance both by sea and land, all the houses being either white-washed or painted in light colours. On the north side of the bay there is a narrow range of detached rocky hills of a sugar-loaf shape, washed by the sea. Beneath these hills a number of houses are crowded together, but the best portion of the town lies on more level ground, one part facing the sea roadstead, and the other portion the harbour. On the south are some rocky islands defending the harbour in that direction, but there is little protection from the south-west, where it is open to the Pacific; and when the wind is from that quarter, and the sea rolls high, ships have no security, and are entirely exposed to the fury of the gales. Large ships anchor generally at the entrance of the harbour, and small vessels come as far as opposite the custom-house, situated near the foot of the hills, where the cargoes are discharged and embarked in small boats, or on the backs of the half naked Mexicans and Negroes. Mazatlan contains from 12,000 to 15,000 inhabitants, of a rather mixed race of the old Aztec Mexicans, Indians, and Spaniards, there being also many Negroes among the lower classes. The town is nicely laid out—rather narrow streets, but containing many large and well-built houses, particularly in the Calle principal and Calle de los Sacrificios. The street leading from the Plaza to the roadstead has several fine houses, among which is one belonging to the firm of Messrs. Jecker and Co., bankers; and the corner house, belonging to the English consul, Mr. Thomson, one of the finest houses of the town, facing the sea, with large warehouse accommodation, terrace, &c. More taste and luxury are looked for in commercial towns than in those of the interior, and accordingly we found Mazatlan to be considerably in advance of any other town of the northern regions and the Pacific parts of Mexico. The houses are more substantial and elegant, and the style is wholly that of the old Castilian, with short columns, Moorish capitals and ornaments. Some houses ("Colonades")

face the "Plaza," which is a fine large square, planted all round with orange-trees, and enclosed by iron railings and stone benches. A band plays there twice or three times a week, attended by all classes of the population. At a little distance, and on an elevation, a large square building has been erected for barracks, where the usual garrison of the town is located. The suburbs extend very far out of the place; here the houses are very small, and have flat roofs like all the houses in town, although many ranchos may already be seen built in the usual style with sticks and adobe, their roofs thatched with palm-leaves. The country north of Mazatlan is flat and marshy, and towards the east hilly, and covered with cocoa-nut trees, which grow down to the water's edge. In the gardens of many houses there are cocoa-nut trees, together with the platana and other tropical plants. All kinds of tropical fruits may also be had here very cheap.

Formerly the steamer from California called here to take up passengers, but the expenses being much greater than the trade derived from their stoppage, they have been lately discontinued.

The climate of Mazatlan is generally healthy, although very hot, particularly in the months of June, July, August, and September, when the mosquitoes, and a much smaller insect, are in great quantities near the sea and at a good distance in the interior. This source of great annoyance is partially removed by mosquito-curtains, found almost in every house of the town.

We found the thermometer ranging from  $85^{\circ}$  to  $105^{\circ}$  in the shade during the month of August, and on our return in November from about  $75^{\circ}$  to  $94^{\circ}$ , the nights being then rather cool and agreeable. The rainy season commences generally in the beginning of July, it acquires its greatest power in August and September, and ceases in October. During its prevalence the mornings are generally very fine, and for many days no rain falls, although in the afternoon, towards 4 o'clock, the clouds will gather. This is generally the only hour when the rain and storm may be looked for.

On account of the heat the Mexicans generally rise very early; the usual business hours are from 7 to 11 o'clock in the morning, when most of the shops close till 4 o'clock, although the merchants' offices, the post-offices, &c., are open during the whole day. The water used in Mazatlan is principally rain-water, for collecting which the larger houses have great tanks or cisterns as reservoirs; but the smaller houses are daily supplied by natives, who carry the water round the town on mules, and in large vessels not unlike the old Egyptian jars. There are large establishments for the reception and supply of water to the town, and a comfortable and clean bath may be had in several fine bath-houses for three and four reals. The washing is also done beautifully, and charged for at the rate of  $1\frac{1}{2}$  dol. per dozen articles of general wearing apparel.

There was only one hotel, kept by a Frenchman, when we came to Mazatlan; it was tolerably well furnished for the place; the bill-of-fare displayed would compare favourably with that of some American and Continental hotels. There is also a café and billiard-room, kept by an Englishman, where good ale, stout, and wine are sold. Although there is a sort of theatre in the town, it is scarcely worth noticing, the accommodation being inferior to that of the other parts of Mexico. Almost every Sunday there is a bull-ring, or "Plaza de toro," which is generally very largely attended by the Mexican population of the town. Foreigners go only there once for curiosity, but are soon disgusted with such brutalising public amusements. In one of the houses of the Plaza there is a café, a sort of gambling-house, where at times very large sums are played for. This place is greatly resorted to on Sundays and holidays. The wholesale and general trade is principally carried on by foreign houses—German, English, French, and Spanish—who supply the interior and north of Mexico with all kinds of European goods; but English manufactures, crockery, and hardware form the largest part of the trade, although the dry goods of France and Germany are largely consumed, the Mexican ladies being exceedingly fond of dress. The shops in the streets are well filled with goods, and some of them may be compared with shops of large provincial towns in Europe. They are mostly kept by foreigners, particularly Spaniards. There is a considerable trade between this port and Guaymas, St. Blas, and the coasting ports of Novachista and Altata. A limited trade is carried on with Manzanilla and Acapulco. The country produces all kinds of tropical fruits, maize, sugar, tobacco, skins; and the export trade to California and to Europe consists chiefly of silver dollars, Brazil or Lima wood, and copper in regulus. The import trade from San Francisco consists of quicksilver, provisions, tea, machinery, flour, drugs, and some other articles of European origin.

The Government has the monopoly of the tobacco and cigarros, the consumption of which is very large; Mexicans of both sexes smoke their paper cigarros all day long. Tobacco is not allowed to pass from one state into another without paying a certain duty. It is the same with gold and silver: one may not carry more than 100 dollars in cash, and this only with a written permission. From the maguay-plant, the Government derives a great income in the shape of licences to manufacturers; stamps, concessions for billiards, and other indirect taxes are likewise a source of income. The revenue of the custom-house for the export duty of  $3\frac{1}{2}$  per cent. on silver is also very large.

But it is very difficult to establish any correct statement or sta-

tistic returns as to the amount of silver and gold exported secretly, or of foreign goods imported, as a very large amount of goods is smuggled into the country all along the extensive and unguarded coast of the Gulf of California.

The country to the north side of Mazatlan, and the road to Culiacan, are marshy; in the swamps near the sea small alligators are very numerous. During our journey we were several times startled by the appearance of reptiles and insects, such as scorpions, large and small snakes, alacrams, centipedes; but they are not so dangerous to the careful traveller as the reader in Europe might fancy. In the forests and fields there is an abundance of deer, hares, rabbits, squirrels, partridges, quails, and foxes; also tiger-cats, chacals, wolves, jaguars, pumas or South American lions; and in the interior of the Sierra, the grizzly and brown bears. There is a jaguar in Mr. Knight's house, a fine specimen, about one year old, very tame, and approachable almost by everybody. It is kept chained to a post near a window in the dining-hall, and now and then allowed to walk loose about the house with its chain round its neck, looking either down in the street from the balcony, or lying quietly under a sofa in the drawing-room.

The harbour of Mazatlan is scarcely fortified: near the entrance on the side of the hill there is the Presidio, which protects the port from the south, but from the east the town is entirely exposed.

In former times the principal trade was carried on in the town of Asilo del Rosario, a great mining place, situated at about 16 leagues east of Mazatlan, and on the main road from Acaponeta (Jalisco) to Culiacan. From this town the Rio del Rosario runs towards the harbour of Mazatlan, and is navigable for small boats, which are used to traffic on it. In former times the merchants came from the different towns of Sonora, Cinaloa, Chihuahua, and Durango to make their purchases there, as they do now in Mazatlan, and a considerable trade was carried on between that place and Guadalajara. The town is situated in a mountain gorge; it has narrow, but well paved and cleaned streets, great stone-built houses, and contained in 1830 about 7000 inhabitants, of which a great number were miners. At a distance of 7 leagues from Mazatlan, and on the road to Rosario, there is a small town called "Villa de San Sebastian," of about 2500 inhabitants, in the neighbourhood of which there is a copper mine, formerly marked for silver amalgamation.

After disposing of all our business in Mazatlan, we took information as to the best and safest way of travelling to El Fuerte by way of Culiacan, which is about 90 leagues from Mazatlan.

We found an opportunity of going by sea in a small coasting craft, of about 60 tons, to Altata, a port situated at the mouth of

the river Culiacan; but this being the season for heavy squalls, added to the bad accommodation on board, we preferred undertaking at once our journey by land on the backs of mules. We inquired as to the prices, and learned that the usual charge for hiring is about 30 dollars per mule from here to El Fuerte, besides 60 dollars, the pay of three mozos (servants), and their board, and the feeding of the mules on the road. I came to an agreement to pay only 150 dollars for nine mules and three servants to Culiacan, trusting to get cheaper rates of accommodation at that place to El Fuerte, in which hope I was not disappointed. We required three pack-mules for our provisions and luggage in order to be able to travel at the usual rate of 15 to 18 leagues per diem, and three servants for attendance and assistance in case of an attack by robbers, of whom we heard almost every day some frightful stories. The country round Mazatlan is rather dangerous for the unaccompanied traveller: murders and robberies occur not unfrequently; nevertheless I afterwards learnt by experience that foreigners are seldom attacked if they are well armed. For every kind of excursion into the interior the best and cheapest plan is to purchase, on arrival at the nearest seaport to the place which has to be surveyed, a couple of good riding-mules for each person, and as many pack-mules as are wanted, with good pack-saddles, saddles, bridles, &c., inasmuch as the prices paid for hire exceed by far the cost price of the mules, the feeding on the road being always at one's own charge. It is advisable also to engage at once one good servant for each person, at the rate of 10 dollars per month. The mules can always be sold again at a very small loss, if they are well kept and cared for by the servants.

We had made all arrangements now for an expedition into the interior, and fixed the following Monday, the 31st July, for starting.

On the 31st of July, at 5 o'clock in the morning, we left Mazatlan for El Fuerte. There are two roads leading to Culiacan, one following the coast through the Pueblo of Cosala, about 36 leagues from Culiacan, a well known mining place, of about 4000 inhabitants, with many gold and silver amalgamation works. In the vicinity of this pueblo there are many smaller villages and farms, the inhabitants of which are engaged in agricultural pursuits, and rearing large numbers of cattle. The climate is very hot; but notwithstanding the intense heat, this place, as well as all the others in the lowlands of Cinaloa through which we travelled, is considered healthy, they all being free from the epidemics which too often accompany such high temperatures. This may in some respects be owing to the westerly breeze which springs up in the evening on the whole coast, and brings with it the cool air from the ocean. But during the rainy season, which commences



ground, passed through the village of Pueblo Viego, and arrived at Carrizal at 11 o'clock in the morning. We resumed our journey at 1, travelling through a straight, level, park-like road, running in a north-westerly direction between the thickly wooded mountains, protected against the scorching rays of the sun by the projecting branches of the trees meeting from both sides. We reached Culiacan about 6 o'clock in the evening, after having travelled 18 leagues that day.

We put up at the hotel, or "meson," the only one in the town, a large and spacious square building in the old Spanish style. The rooms are of a very good size, and have their entrance from the large corridor surrounding the inner yard. The walls are bare, nor have the rooms any other furniture but a rough wooden bedstead, a few chairs, and a small common deal table; neither bedding, linen, nor any other necessities could be had, and we were glad to have our mattresses, sheets, and blankets with us, to make our temporary home a little more comfortable than the lodgings we had been accustomed to all along the road. The marked difference in the accommodation of this place compared to Mazatlan showed us already what we should have to prepare for hereafter, and that we should have to give up all idea of European comfort, and accustom ourselves to a rough ranger's life. The hotel-keeper was a Chinaman, and his table was really so good that we enjoyed our meals as much, after the bad food on the road, as though we had been in an hotel in Paris. We remained four days in Culiacan, and, through the kind assistance of an Englishman—Mr. Wm. Mackintosh, jun.—we hired other mules and servants at very cheap rates, and sent those we had back to Mazatlan. The usual price for the hire of a mule from here to El Fuerte is sixteen dollars, including all servants' wages and their board on the road.

Culiacan is the capital of the province of Cinaloa, situated on the southern part of a large river of the same name at the foot of the lower ranges of mountains, coming from the high Sierra, at a distance of about 25 leagues. The town is built on the spot where the old city of Hueicollhuacan formerly stood, so famous in Mexican history. It is the seat of the Bishop and Governor of the whole province, with a population of about 9500 inhabitants. The town is very regularly laid out: its streets all run in right angles from the principal square, "The Plaza," which is surrounded with fine large stone colonnade buildings. The cathedral, facing the "Plaza" to the east, is very old and dilapidated, but the interior is very large, and is decorated with some fine paintings. Among the houses forming the colonnade there is a club-house and gambling-room with billiards, which is a favourite amusement of the Mexicans. I have met with it even in the

remotest mining places of the Sierra. Most of these houses are beautifully furnished, and are inhabited by a great number of wealthy families, whose fortunes are chiefly derived from the working of the numberless silver mines in the adjoining Sierra. The principal streets have also a number of very fine shops stocked chiefly with English and French manufactured goods. There are also two apothecaries' and chemists' shops, the last we met with on our journey northwards. The largest building is the "Casa de Moneda," or Mint, built not many years ago by Mr. Mackintosh at a cost of 350,000 dollars. The amalgamation-works, with laboratory, offices, and other accommodations for the manufacture of their acids for smelting, refining, and assaying gold and silver, are very extensive, and most conveniently placed: all the machinery came from England at a great expense. The privilege of the Mint is under a lease from the Government; the present lessee is Mr. Granados. Mr. Wm. Mackintosh is a nephew of the founder of the Mint, and partner in the house of Messrs. Granados. The amount coined last year reached very nearly two millions of dollars in gold and silver, derived from the different mines of this district of Mexico, all worked by private parties, and on a very limited scale. Mr. Granados stated that if only a little of that intelligence, labour, and capital, which is annually wasted in useless researches in England, could be practically bestowed upon the immense hidden mineral wealth of these regions, the produce would be incredibly large.

Besides the occupation of silver mining, the population is engaged in the trade of the well-known Lima or Nicaragua wood, which grows all along the mountains of the Sierra, from St. Blas up to Sonora, and which is largely cut down in this neighbourhood and exported in small vessels from the little sea-port of "Altata," at a distance of about 15 leagues from Culiacan. The river Culiacan has its source in the state of Durango, and rises very high during the rainy season, but afterwards it can easily be crossed on horseback. Part of the land close to the town is cultivated, whereas the greater part of the country on the road to Culiacan is in the wild original state of nature; nevertheless here and there large farm-houses, ranchos, and haciendas are to be seen on the banks of several small rivers which fall into the great river below the town, and in the villages. From time to time the eye rests with pleasure and relief on the great tracts of land cultivated with sugar-cane, maize, and other Indian crops. Waste land may be claimed by anybody who will undertake to cultivate it, and the husbandman who understands his work in the least is always largely repaid for his trouble. There are many very rich farmers possessing thousands of heads of cattle, fields, and haciendas, but, unfortunately, the country is too thinly populated, the

majority of the present race is too indolent, and agriculture, compared with silver mining, is considered by them too slow a medium of obtaining wealth.

The inhabitants of Culiacan are of a better defined race, and less mixed with negroes and other races, than the population of Mazatlan. The whiter population of Culiacan and Cinaloa generally consist of descendants from the old Biscayan and Catalanian Spanish settlers, who, true to their origin, still preserve in their character a more lively, sincere, business-like stamp than the other races of Mexico. The men are well-built, strong, and healthy; the women generally pretty, of a fine white colour and clear skin, and mostly possessed of a pleasing deportment of natural grace. The blue eye and light hair, so uncommon in the country, point out many a family as the purer descendants in the generation from their Moorish ancestors.

Music, dancing, and singing, and also gambling, are the favourite amusements of both sexes. A band plays very often on the "Plaza" in the evening, and a very primitive kind of theatre has been got up in the court-yard of an old house for dramatic performances.

The Indians of the state of Cinaloa belong to different tribes: towards the south, in the country and in the Sierra, the Coras, Najarites, and Hueicolhues are to be found; to the north of Culiacan, the Cinaloas, Cochitas, and Tuvares; and towards the town of El Fuerte, and farther north, we find the Mayos Indians, to which belong also the tribes of "Quasare," "Ahome," and "Ocoronis." The main tribe of the Mayos Indians live principally to the west of El Fuerte and Alamos, and their chief villages and towns are Santa Cruz de Mayo, or Quitivis, Echajoa, Nabajoa, Curimpo, Tuia, and Camoa. The Yaquis are still farther north, and belong entirely to the state of Sonora. All these Indians are very good labourers for agricultural and mining purposes; and, if assisted by missionaries, their intellects would be much improved, as they have a good disposition for civilized life. They are very good guides, and can walk all day long. They are generally of a copper colour, some of them violet-brown, and others lighter red-brown. They are well made, and many of the tribes are strong-built men. Their whole dress consists either of a piece of woollen stuff tied round the loins, or a coarse sort of a large cloak which they hang over the shoulders in the higher regions of the Sierra. Their weapons are bows, arrows, and lances, which they use to perfection. They all obey one governor, who is their general. Some of the Indians mix with the lower classes of the Mexican population, the result of which is a great variety of mixed races.

The temperature of Culiacan is the same as that of Mazatlan, although one does not meet with so many mosquitoes. The heat in

the day in the month of August was from  $95^{\circ}$  to  $98^{\circ}$  in the shade, often as much as  $104^{\circ}$ ; during the night it fell to  $88^{\circ}$  and  $90^{\circ}$ . The rainy season being just on, we had rain almost every day, with terrible thunderstorms and immense falls of water.

The winter is very mild, and on our return, three months afterwards, we found the evenings much cooler and more comfortable, although in the middle of the day the thermometer rose to  $94^{\circ}$  and  $96^{\circ}$ .

After collecting the necessary information for our journey we prepared for starting, by no means frightened at the tale which reached our ears, that a party of Mexican robbers might attack us on the road. We took care to have our arms ready for any emergency, and made great parade of them when riding through a town or village. The sight alone of fire-arms in the hands of foreigners will prevent the Mexicans from attacking them, except the numbers are much in their favour. On our road we met with immense varieties of all kinds of coloured birds, from the largest parrot to the smallest humming-bird: they abound in this part of Mexico.

*Aug. 9th.*—We crossed the two arms of the river a little below the town at three o'clock in the afternoon, and had a good ride on our fresh mules; our bodies seemed also doubly refreshed for a new journey. One of our servants was a fine and good old Mexican; he had made this same journey for more than forty years, and is known almost to everybody on the road; but in spite of his serious apprehension of an attack, supported by many of his stories of murders and robberies, we got clear of all danger, and at eight o'clock arrived safely at Poteron, about 8 leagues from Culiacan, where we stopped for the night. The country being very beautiful in scenery, the road quite level, and the distance short, we felt not much fatigued, and after resting till three o'clock in the morning, we prepared again to start.

*Aug. 10th.*—We left the rancho at four o'clock, and had a very long ride until we reached the village of Morita, at about twelve o'clock, after passing the Rio Imapa, and the villages of La Platana, Mescalita, and other smaller places on the road. Here we dined, and remained till three o'clock, when we started again and reached the village of Aquajita towards seven o'clock in the evening, having that day made about 18 leagues on level ground. We met a Mexican who had been in California, and who was quite delighted to see some Europeans claiming hospitality in his house. Before leaving Culiacan we fell in with a Scotchman, who came down from Sonora with some fine specimens of minerals.

*Aug. 11th.*—We started at four o'clock, passing the villages of La Noria, El Palma, and, at half-past eight o'clock, the town of Mocorito, situated on a river of the same name. Crossing the river, we put up on the other side at a very large rancho for dinner,

which we had under a large lime-tree, and left again at three o'clock, arriving at Ciengita towards seven o'clock in the evening, after having made 16 leagues that day.

*Aug. 12th.*—We left Ciengita at three o'clock in the morning, while it was yet dark. The consequence was that we lost our way in the surrounding woods, and had great trouble to find the right road again. After passing the village of Coyote we arrived at the town of Cinaloa towards twelve o'clock, having made 10 leagues that day. I delivered my letters of introduction to a Spanish merchant of the place, and obtained through him some valuable information respecting the silver and copper mines of the surrounding districts.

Cinaloa, formerly called Villa de San Felipe y Santiago de Cinaloa, is situated on the left bank of the river of the same name, and in the main road from Culiacan to El Fuerte and Sonora. The town is built on hilly ground, and was formerly very flourishing, with upwards of 9500 inhabitants; but now it is almost desolate, and counts scarcely more than 3000 souls. It had a very fine cathedral, built by the old Spanish missionaries on the top of a hill, in a half-Moorish style, with a lofty roof, and possessing an altar-piece of massive silver. Formerly another large church stood in the lower part of the town on "The Plaza;" but there is nothing left of it but the tower, as the nave and choir have been swept away many years ago by a tremendous flood coming down from the neighbouring mountain.

*Aug. 13th.*—We started at five o'clock in the morning, and by eleven o'clock, after travelling 9 leagues, arrived at the rancho, on the river Ocoroni, opposite the old village of Qcorona. Owing to the late heavy rains in the Sierra the river was swollen to such a height that we were obliged to stop there for a whole day, waiting for the fall of the waters. We went out shooting, and in the evening some Indians and Mexicans of both sexes from the surrounding ranchos came to see us, and to ask all kinds of medical advice, having an impression that every European traveller must be more or less a medical man. The same circumstances occurred to me very frequently, particularly in the interior of the country, where I dispensed with pleasure my little knowledge of some simple and wholesome household prescriptions to those poor creatures, of whom many go to an early grave, either through their own neglect, or for want of application of the plainest remedies at the proper times.

*Aug. 14th.*—Towards ten o'clock in the morning the water had fallen low enough to allow our passing the river; our saddles and personal luggage were carried over on the heads of Mexicans and Indians, who are wonderfully sure-footed even in a rapid stream, and who can just as easily swim across with a heavy load on their

head, if there is no other way left for crossing these wild mountain streams during the rainy season. We passed the village of Ocorona, and following for several hours a beautiful even road, with maize plantations on either side, entered some of the mountain-gorges of the first out-branches of the Sierra Madre. Starting from Culiacan, we had to pass over several hills and undulating grounds covered with thick underwood, on a road winding here and there between high mountains, which were stretching far out from the adjoining Sierra towards the coast, their several high peaks being visible from the sea. Before reaching the village of La Morita the road emerges into a fine open country, showing on one side endless plains, large tracts of which are cultivated with a tall luxuriant maize, frijoles (beans), and sugar-cane; and on the other side the great chain of the Sierra Madre, constantly visible, at more or less distance, with its lofty peaks, high abrupt cliffs, and mountain-ridges sloping gradually down into the beautiful valleys. In fact, from this point to Cinaloa and Ocorona, the country seems like a fertile garden, studded in all directions with numberless farms containing hundreds of heads of cattle and horses, and forms one of the most densely-populated districts in the whole province. The adjoining woods are rich in all kinds of tropical plants, wild indigo, cochineal, medicinal herbs, balsam, gums, and Brazil and other dye-woods, the greater part of which being allowed to rot or decay, become useless to the present small population, who are either too ignorant or too apathetic to turn the same to commercial advantage. The principal occupation of the Mexicans is silver mining: their whole attention seems to be directed to this important branch of industry, from which most of the rich families derive their fortune. In the mountain-ridges of the Sierra, from Mazatlan towards the boundaries of Chihuahua and Sonora, there are numberless works for silver amalgamation. By a careful and never overlooked inquiry in each of the small villages we passed on our road, I invariably heard of some silver mining, which was carried on in the adjoining mountain with more or less success; but the greater number of the miners can apply only very limited means for working, and in case of a "Bonanza," or a fortunate discovery of a rich deposit of silver, they spend most of their money in gambling, or in some other equally foolish manner, not feeling the necessity of surrounding themselves with such luxuries as are considered essential to the comfort of European life. The country, therefore, does not profit much by the immense quantities of gold and silver which are every year extracted from the bowels of the earth. Nevertheless, I was informed that great improvements have been made during the last ten years; and it is to be hoped that, with free

trade and more liberal and enlightened institutions, the population will gradually rise to a position more in accordance with the possession of such a rich and beautiful country.

For several hours we pursued our journey in a northerly direction, through a deep, narrow valley, by the side of a mountain-stream, which we had to cross several times, and gradually reached an elevated little plain, on which the small village of Tasajera is situated. This village consists of scarcely a dozen huts, and seems to be shut out from all communication, being surrounded by mountains and ranges of very high peaks.

After a short stay for refreshment we started again by three o'clock, our way winding through thick brushwood and grass, over hilly ground, between narrow mountain-gorges, till we reached a large plain where the mountain-ridges divided, one running north-east and the other in a south-westerly direction. We now entered once more on fertile ground in a fine open country, where we had a most extensive view of the endless plain stretching itself before us towards El Fuerte.

At seven P.M. we reached the small but flourishing village of Ojita, finely situated at the foot of the mountain whence we had just emerged, after having travelled 15 leagues that day.

*Aug. 15th.*—We left Ojita at five o'clock in the morning, and by six we passed the larger village of Montaya, after several times crossing a stream which has its source in the neighbouring mountains, and which ultimately joins the Rio Santa Maria. On our road we passed many well-cultivated tracts of country full of cattle, although by far the largest portion is still lying waste, waiting for the hands of future generations to redeem it from its present condition.

At eleven o'clock we reached the town of El Fuerte, at a distance of about 8 leagues from Ajita. There being no hotel or "meson" in the place, we put up at a good-looking private house, where we were well received. After settling with our arriero for our mules, we presented our letters to the principal merchant in the town, and were much gratified to obtain all the information and assistance which we were in need of for our journey into the interior of the Sierra. We remained here for several days, waiting for a gentleman who we expected would arrive, and accompany us to his residence at Chois, at the foot of the Sierra, about 15 leagues from El Fuerte.

We had ample time to see not only all the adjacent country, but also the town itself, the appearance of which bears no comparison with Culiacan. It is situated in latitude  $26^{\circ} 56'$ , and longitude  $108^{\circ} 59'$ , on the southern bank of the river of the same name, which is very broad and deep near the town, and rises to a great height during the rainy season. The Rio El Fuerte

has its source far in the interior of the Sierra in the districts of Huacaybo and Pajichic, and is first called Rio de Urique, as it flows by the town of the same name in a south-easterly direction; and, collecting in its south-easterly course many smaller mountain-streams, it is joined at Calavas by a large river which comes from the south-west, being formed through the junction of the two rivers, the Rio de Batopilas, rising in the Sierra near Loredo, and the Rio Verde and San Miguel, having their different sources in the far distant mineral districts near Laguna Narogame, and Cruces, in the high Sierra. In its onward westerly course, it is farther joined by several smaller streams, by the larger Rio de Otero coming down from the Sierra near Magurichic in a south-easterly direction, and by the Rio de Chois coming from the south-west. Being thus strengthened by all the waters gathered within a circuit of upwards of 400 miles, and still within the watershed of the west part of the Great Cordillera, the Rio El Fuerte flows almost in a due westerly direction through the whole province of Cinaloa, dividing it at the same time from the province of Sonora, and ultimately falling into the Gulf of California at a distance of about 30 leagues from El Fuerte. From this latter place a direct road leads in a west north-westerly direction, by way of Alamos to Guaymas, the only great shipping port of Sonora, whilst another road in a south-easterly direction leads to the coasting port of Novachista, at the mouth of the Rio Cinaloa; and at a distance of about 45 leagues from El Fuerte there is also a road along the south bank of the river towards its mouth, leading to the Indian town of Arboleta, but it is not much used.

The town of El Fuerte, formerly called "Montesclaros," is situated at about 7 leagues from the boundaries of the province of Sonora. It contained in 1830 about 3000 inhabitants; its population has since increased on a very limited scale only. Before the great revolution El Fuerte was a very small village, consisting chiefly of Indian huts and a small fort built on a hillock near the river, but after the Declaration of Independence the government of Sonora had its seat here for a considerable time. The place was then flourishing, and the population increased rapidly to about 5000 inhabitants, but, through transferring the seat of government to the town of Alamos, 26 leagues distant, west by north, the prosperity and industry of El Fuerte was arrested in its progress, and the population dwindled down so much, that in 1830 it scarcely consisted of 3000 inhabitants.

The town contains nothing worthy of notice save, in its centre, a fine cathedral which stands, with the large buildings belonging to Messrs. Ibarra and Orantio, in an extensive but much neglected square. The country from El Fuerte down to the sea-coast is marshy and sandy, although some small hills from time to time



We continued our way on a level road for some time, breathing the pure air of the mountain without suffering from the heat, which is so oppressive in the lower regions. Passing a large rancho, and following up the road among trees, we came to a fine romantic spot near a waterfall, where we halted for breakfast, camping in the shade of a tall tree; we enjoyed this heartily after our long morning ride, and started again by three o'clock, having the mountains of Bahuerachic at some distance before us. We soon entered a beautiful large valley, fully cultivated with maize and sugar-cane, with a fine rancho and garden in its centre. About 5 miles from this place the road branches out into two directions, one to the right leading to the village and mines of Bahuerachic, a distance of about 7 miles; the other to the left, which we took, leads in a north-easterly direction to the old mineral town of Urique. At this point we entered the province of Chihuahua, being the boundary between this state and the state of Cinaloa; at a distance of about 18 leagues from Chois. We followed a small path over several hills, entered another fine valley crossed by a small stream, and came to the little Indian village of "Agua Caliente," called so on account of its hot spring of mineral water. We pitched our tents on a neighbouring hill; but the heavy rains and storm soon compelled us to seek the shelter of an Indian hut, where we passed the night, all crowded together on the floor of a single room.

*Thursday, Aug. 29th.*—Started early in the morning, and found it rather cool for the first time since we left Chois, the village being situate at a considerable height above the level of the sea, in the regions of oak and fruit-trees, called "Terra Templada." Ascending constantly a branch of the great chain of the Cordillera, we were fast advancing towards the "Terra fria" or "Sierra alta:" those extensive, inhospitable regions, densely wooded with small oak, fir, and majestic pine-trees, and inhabited only by a few tribes of Indians. The travelling in the shade of these primitive forests is most agreeable, the climate at this great elevation being similar to that of the continent of Europe. The geology of the soil, from Chois to this point, presents to the mineralogist many interesting features. On our journey we met with sandstone, slate, and gneiss, also with porphyry, diorite, basalt, granite, and other plutonic rocks, &c., &c. In the higher regions the limestone formations are predominant all over the Sierra.

After an ascent of upwards of  $4\frac{1}{2}$  hours we reached the summit of a mountain, where we had a fine view over the hills we had passed for the last few days, but another mountain was still before us, which we had to ascend, and it was not until noon that we reached a great plateau, the summit of one of the highest points of this part of the Cordillera, a height of about 8000 to 9000

feet above the level of the sea. A splendid panorama now opened to our eyes, most difficult to describe, for its grandeur, beauty, and extent in all directions. Before us at some distance, and much beneath our feet, appeared the rugged and remarkable shape of our guide, "The Mountains of Anderson's Mine;" and looking down from our present elevation, the hills and mountains which we passed over since our departure from Choix dwindled down in appearance to an undulating ground, with small hills and mountains. The effect of this scenery was greatly heightened by the variety of colours of the foliage of the different kinds of trees from the tropical regions up to the *Terra Fria*, and the whole of this grand landscape was pleasingly embellished with fine ranchos and large open valleys, mostly cultivated with Indian corn. Behind us the scenery was of a different nature. The leading chain of the great Sierra Madre appeared in its abrupt and irregular outlines, with rocks rising perpendicularly from their base to an enormous elevation. Pine-trees and dwarf oaks are the only vegetation on the summits of these mountains; in the crevices of fallen rocks, and in the parts a little lower, the cactus is seen only in isolated groups. After enjoying for a time this grand scene, we proceeded a few miles farther to a suitable place for encampment to prepare our meal. We had scarcely finished when a tremendous storm with rain set in: the thunder-claps in these solitary regions, and the continuous lightning, were awfully grand; the dark clouds which overhung the mountains changed suddenly the day almost into night.

Towards 4 o'clock the weather cleared up, and we were just starting, when a Frenchman, working a silver-mine in the neighbourhood, came up and informed us that he had discovered a rich copper-mine, and showed us samples of ores, which appeared to be rich oxides. We made therefore an appointment to survey the mine on our return, and proceeded farther in his company through a thick pine forest. Darkness, however, came suddenly, to our great annoyance. Mr. Verneuil and I lost sight of the Frenchman and our Indian guides and servants, who went much in advance to look out for a suitable spot to pitch our tent for the night. Meanwhile another heavy shower, accompanied with thunder and lightning, began to fall in such torrents that it was impossible to move any farther on our road. Our position was now very critical, as we all got separated at great distances from each other, knowing our respective distances only by the repeated calls, which often were only answered by the echo. To complete my misfortune, my mule refused to advance any farther, and compelled me to resign myself to my fate, and to prepare for passing the night in this solitary wilderness, where I could not hope to find an Indian hut or rancho. Some most powerful

flashes of lightning enabled me to gather a few branches of turpentine-wood, which I cut into small splinters, and, with the aid of a box of wax-matches, I succeeded after a great deal of trouble in making a good fire under a tree, which soon enabled Mr. Verneuil to find me. Shortly afterwards we had the pleasure to see our missing party at some distance, and, dragging our mules behind us, lost no time in joining them; but here we had to wait upwards of an hour, in an incessant heavy rain, until our Mexicans and Indians had brought in our strayed pack-mules, which carried our tents, provisions, and clothing. Although we had a tremendous fire to warm us, we felt severely the effects of the bad weather; and the cold wind blowing during the whole night at this great elevation, we had but a few hours' rest, when we had to get up to prepare our breakfast, and to start as usual at sunrise.

*Aug. 30th.*—Descending for upwards of two hours, we crossed a fine valley like a garden, fully covered with peach and apple-trees, planted, we were told, in former times by some Spanish missionaries. We afterwards reached a plain of about 5 miles by 4, cultivated with maize, and ascended gradually another branch of the Sierra, which, although not so high as the other, left us still in "terra fria" among pine-trees.

Towards 12 o'clock we reached a fine open spot, between two high hills, cultivated with maize by an Indian family living in huts built on poles. We had to pitch our tents at once for the night, as the sky again became overcast; during the rainy season, rain and storm may be looked for in the Sierra with certainty every afternoon. We made a very large fire before the tent, and had a good dinner, consisting of roasted dried beef, "carne seca," which we always carried with us, and cheese, pinola, and some tortillas, which we got from the Indians.

*Aug. 31st.*—We started at six in the morning, and following up a road alongside a rio for several hours through a dense forest, suddenly reached a fine open plateau, from which we had a most magnificent view over the lofty chains of the Great Cordillera.

In the centre of a valley, about 3 or 4 miles distant, the old mineral town of Urique presented itself to our view, some 5000 feet below. A large river of the same name, having its source in the district of Huacaybo, high up in the Sierra, passed the town, winding round the distant hills and mountains. The descent here is very steep, and we had great difficulty in getting over large stones and broken masses of rocks thrown about in all directions; abrupt cliffs, in many instances thousands of feet high from their immediate base, fallen-in craters of extinct volcanoes, and immense rocks of lava and porphyry, presented an entirely different appearance to any view we had had before.

In our descent from the plateau to the village we passed successively through three different climates—from the “terra fria,” or cold regions, where we felt the want of our wrappers, down to the “terra caliente,” where the heat was as intense as in El Fuerte, although Urique is situate upwards of 1500 feet above the level of the sea. Each region had its different flowers, plants, and fruit-trees: in the higher part we found peaches and apples; lower down we enjoyed the yellow and pink cactus-fruit, with its delicious flavour; and in the “terra caliente,” the banana, water-melon, orange, &c., were in great abundance, and in full maturity.

Maize is cultivated in the higher regions, as well as in the lower, where it grows to a height of from 12 to 18 feet, particularly when near a rio. Here is an endless field open to the naturalist and botanist, as well as to the geologist and mineralogist. Towards 4 o'clock we reached the town of Urique; but the river was so swollen and rapid, that it was impossible to pass it on horseback. As there are no boats, we were compelled to remain a few days longer in Urique, to wait for the fall of the stream. We put up at the house of Mr. Vinegra, the son of an old Spaniard who had worked many silver mines in this district, and had left to his family the famous silver mine “Del Rosario.”

*September 1st.*—Urique is an old mineral town which, before the expulsion of the Spaniards, was the centre of extensive silver-mining districts, with a population of upwards of 6000: at present it does not exceed 800 souls. A great number of silver-mines have been worked in the immediate vicinity of this place, as well as of a village 2 miles farther north, called Guadalupe, and great wealth has been drawn from this locality. The mountain facing the town contains a large number of rich silver-lead lodes, many of which have been opened in former days, but for the want of capital and energy they are now abandoned, and have to wait for a more industrious race of people. A few mines are occasionally worked by “Gambusinos,” or Mexican miners, who pick the best ores out of the different lodes, and make but a poor living by it. The most important and richest mine known at present is the old mine La Señora del Rosario, but being full of water its richness is of no avail to the proprietor, who has no capital to finish the adit level which was begun many years ago. Since this part of the Journal was written, I have received intelligence from Urique that an American company has taken up this famous mine and is engaged in completing the adit level. This level, or “socabon,” has been driven in only 30 varas, but requires 90 varas more in order to reach the main lode, to cut 17 other lodes running parallel with it, and to drain all the lodes of the water which now prevents the working of them. There are other mines as good as “Rosario,” but abandoned since the time the Spaniards

left the country. They are—La Escubierto, la Antonia, la Patrona, la Prieta al Ancona, la Gona San Gallitano, Jesus Maria, &c., which have formerly produced ore from 2 to 20 marcs per carga.

Urique is situate about 40 leagues from Choís, and the surrounding country is highly adapted to agricultural purposes. Cattle and maize are abundant, and all other necessities of life obtainable from the Tarahumare Indians, who inhabit the adjoining Sierra, and bring down apples, peaches, and other fruits in large quantities. An Indian thinks nothing of walking 30 to 40 leagues to sell his load of peaches or apples for one or two dollars. There is water all the year round in the river; but in the rainy season, the numerous mountain-streams falling into it all along its course from its source to the town create such a rise as to prevent all traffic. The sugar of the country is brought by mules from Choís, also coffee, colonial produce, and foreign manufactured goods, the sale of which is very limited on account of the many hands through which they have to pass before reaching the consumer. In this district, as well as in the interior, almost the only foreign goods to be met with are the British manufactures of Manchester and Sheffield, English crockery, &c., very few American articles finding their way over the Sierra into these territories from Chihuahua, although large caravans arrive there every year from the United States over the plains, *viâ* Texas and the north-east mountain ranges.

As very few Europeans visit these regions, we created quite a sensation among the inhabitants; and hearing that we came to survey the district on account of its minerals, a hope sprang up among them that we had come to take up the mines and give them some work, which they would most readily accept. Not only in this, but in many other localities on our journey, the population longed for the good old times of the Spaniards. They possess very good feelings towards Europeans. The want of a new element to elevate the population from its present miserable condition is severely felt among all classes in northern Mexico; and energetic foreigners with a *bonâ fide* purpose and industry would be cordially received by all the natives. After remaining about four days in Urique we succeeded in crossing the river a little to the north of the town, and set out on our journey to the district of Huacaybo, in order to examine some unusually rich copper and silver mines, of which we had heard before starting for El Fuerte. We passed the entirely deserted mining town of Guadalupe, and a few leagues farther on ascended the central ridge of the Great Cordillera. The following evening we reached the summit of the Sierra Alta, after a long uphill journey. We felt the cold very severely during the night, for

which we were scarcely provided, although we kept a large fire before our tents. These regions are inhabited by friendly Indians of the Tarahumare tribe, who live in small huts, generally built in the centre of fertile valleys, planted with maize and frijoles, and a great number of peach and apple-trees, which fruit we found a great luxury compared with our ordinary daily food. The difference of the temperature, the purity of the air and the vegetation, indicated that we were now travelling at a much greater elevation than the former ridges we had passed, and which, from some occasional prominent point, we could distinguish in the distance, at apparently much lower levels.

There are no roads across these forests; that which is called the "*Camino Real*" of the old Spaniards is a very narrow path, which, on account of its little frequency and the great rains, has disappeared in most parts of the Sierra. We followed the cordon or circuit-roads on the plateaux, in order to avoid the repeated descents and ascents of intervening valleys of from 1500 to 2000 feet, which were often very fatiguing to ourselves and our mules. We thus travelled over many more leagues than the Indians do who are accustomed to mountain travelling. Before leaving Urique we engaged a resident Mexican as a guide, who being well acquainted with the part of the country we wished to visit, and understanding the language of the Indians, was of great service to us along the road, where he procured us Indians as special guides. The road now became very dangerous; in some places it led over rocks, scarcely admitting passage for a single mule. We could only make short journeys; the rain set in in torrents almost every afternoon, and prevented our progress. Instead of the jaguar, the puma, and other wild animals of the lower regions, the grizzly bear lives almost undisturbed in the dense forests, and is much feared by the Indians, among whom it makes occasionally fearful ravages. On our reaching the old Indian town of Huahuachic, we were told by the chief of the place, an old, fine-looking, good-humoured Indian, that only the week before, on the very same road we passed, several arrieros and Indians had been attacked and devoured by bears.

The Indians are very skilful with their arrows and lances, with which they kill all wild animals. Some of them attack the grizzly bear with a heavy stick only, with which they dexterously give him a blow on the nose, and whilst thus stunned finish him with their arrows and lances. There is abundance of game all about the Sierra, and the amusements of the Indians are very similar to ours. Those who are wealthy stake horses, mules, or produce, on foot or horse races, and often lose their all by such sport.

Their dress consists, generally speaking, of roughly-made ponchos, coming down to the knee, but sufficiently strong to pro-

tect them against the inclemency of the weather ; but they do not wear, like the Mexicans, leather sandals. Most of them are bare-legged and bare-footed, and, in fine weather, have only a shirt or a few rags round their loins. The women are dressed, or rather barely covered, like the men ; the better classes among them dress like the Mexicans. They are all very superstitious, and the converted Indians, as well as the Gentiles, still hold to their old traditions. They will not disclose to any Mexican or white man the spot where a silver mine has been discovered. They still dread the punishment of sudden death by Providence, which fear has been imposed on them by the first Jesuit missionaries who came among them, and who have forbidden them to communicate to any but to their religious confessors the place of hidden treasures. I spoke to one who said he knew a very rich mine, but would not tell me where it was. It seemed, however, that our guide knew some trick to possess himself of their secret now and then.

Huahuachic is situated in the centre of a small valley, on a high plateau, and has a population of about 400 souls, mostly Indians. Close to where we halted for the day, was a fine garden full of peach and apple-trees, bearing immense quantities of fruit. The other available part of the valley is cultivated with maize and frijoles ; it contained also cattle and poultry in abundance. In former times this place was more visited from its having been on the high road from the province of Sonora, by way of El Fuerte, Urique, Huahuachic, Batoseágachic, Cusihiurrachic, into the state and city of Chihuahua, about 60 or 70 leagues distant.

On our leaving the Indian town of Huahuachic we took another special guide to accompany us to Huacaybo, and purchased some provisions for the road. From this place a road leads, to the westward, to the very important mining district of Maquarachic, where silver-mines are worked by some Mexicans, and farther to the north-west, to the famous old silver-mine of "Jesus Maria," by way of Cajurichic and "Aguas Calientes."

*Jesus Maria.*—Under the head of silver mines we shall have to speak at greater length of this place. Its gold mines, however, have also, at times, been very rich. The Mina del Rosario, even lately, has yielded 10,000 dollars of gold every week. At the present moment it is abandoned. In general, gold mines are thought less valuable here than silver mines. They are less constant, the stealing of the ore is more easy, and their failure may in a short time destroy the capital invested. The gold of Mulatos, as well as of Jesus Maria, is extracted by a real mining process from the rocks "in situ." This place—"Mulatos"—is situated in the extreme south-western corner of the state, 120 leagues distant from the city of Chihuahua. Its mines were very rich at

the time of the Spaniards, but have been abandoned since their expulsion. From time to time, however, some poor people make a living by collecting a small portion of the precious metal. At present, by far the greater part of the gold and silver obtained from the mines of this country is gathered and extracted by this kind of mining squatters, who can only make use of the poorest means of which the art of mining and of metallurgy has to dispose. In Mexican miners' language they are known under the name of "Gambusinos."

The above-mentioned famous mining place—Jesus Maria—is a town in the Sierra Madre, on the head waters of the Rio Mayo, and near the frontier of the state of Sonora. Immense wealth was extracted from the numerous mines in its neighbourhood at the time of the Spaniards. Its silver ores always contain gold in a sufficient ratio to make the marc worth ten dollars. The mine called "Santa Ludubigen" has been worked since the expulsion of the Spaniards. In the six months from May to October, 1839, it yielded a net profit of 400,000 dollars; and during the two years 1845 and 1846, again 500,000 dollars were cleared by the concern. The chief mine of Jesus Maria, however, which is the "Santa Juliana," has never been worked since the time of the former masters of the country. This mine is 300 varas (278 yards) deep, and is now filled with water. According to a reliable calculation, 200,000 dollars would be necessary to begin working it again on as large a scale as would correspond to its importance. The ores have proved never to contain less than 3 marcs, or 24 ounces of silver, and have even reached 40 marcs, or 320 ounces in one carga, or 300 lbs.; the marc by its quantity of gold being worth 10 dollars here, as already mentioned. To clear this mine of its water, a steam-engine would be necessary; and it may be observed here, that there is no want of wood for fuel at Jesus Maria, all the mountains of the Sierra Madre being covered with timber. How profitable the mines of this place could be made if worked with all the means of advanced art, may be seen from the fact, that many of the "Gambusinos" make a living, and that those who provide them with funds make money even by a minute part of the treasures which they contain. Some gentlemen living at Jesus Maria lend money to the miners on the condition of being repaid after the expiration of one month, in bullion at a price of 16 per cent. beneath that paid by the mint of Chihuahua. One gentleman by investing a capital of 200,000 dollars in this kind of speculation fully doubled it in one year. The mint of Chihuahua paying 16 per cent. more than the miner receives, pays, nevertheless, about twenty per cent. less than the silver is really worth, having, besides, the advantage of one month's interest



by retaining the silver alloyed with gold for the purpose of separating it.

At a distance of 12 leagues from *Jesus Maria* a very rich mine was discovered some years ago. This is the mine of

*Pertenencia*.—The ores of this place have been found to contain from 3 to 120 marcs of silver in each carga, or 300lbs. The average ratio proved to be 6 marcs. For a certain length of time, 300 cargas were extracted every week, containing 2,400 marcs of silver, corresponding to a value of 24,000 dollars a-week. The expenses of mining for that quantity of ores were 600 dollars, those of extracting the silver from the ores 3,000, total expenses 3,600 dollars. These, subtracted from the above produce, left a net profit of 21,400 dollars per week.

Were it the purpose of these Notes to exhaust the subject, a great number of other mines in the neighbourhood of *Jesus Maria* might be named. This, however, would not add a corresponding share of interest to our statements, and we prefer drawing the reader's attention only to the more prominent facts concerning the mineral wealth of this country.

*Corralitos*.—This mining place is situated in the northern part of the state, on the Rio de las Casas Grandes, which flowing in a northern direction towards the Rio Gila, but not reaching that river, empties itself into the Laguna de Guzman. The place is distant from the capital of the state about 90 leagues. The silver here too is alloyed with a certain proportion of gold, which, however, appears to be smaller than in the ores of *Jesus Maria*, the marc being worth but  $9\frac{1}{2}$  dollars. Two mines have been worked at *Corralitos*, of which the one was bought some years ago by the present owner for the sum of 40,000 dollars. At that time it yielded 1,000 marcs every month. The monthly expenses amounted to 4,000 dollars, and a monthly net profit of 5,500 dollars was obtained in that manner. How it progressed since that time we have not been informed, but the nature of the mine would allow an increase of its produce to four times the amount just mentioned. Some difficulties, however, exist: *Corralitos* is one of the places most exposed to the depredations of the Apache Indians, who live in the neighbouring mountains. These savages, by stealing horses, mules, and cattle, and making the road between *Corralitos* and the capital unsafe, contribute in a high degree to the very high price which nearly all the necessaries of life here bear.

South of *Jesus Maria* is an extensive district of the Sierra Madre, in which hundreds of very rich silver mines are scattered about. It is situated at the head waters of the Rio del Fuerte, a tributary of the Gulf of California. The most important place of this district is the town of *Batoseágachic* (likewise spelt *Batosé-*

gachi), where the government of the state has placed an assayer's office.

After leaving the capital, the first place of this district is Yuquivo. Here are several rich mines and metallic veins, which have never yet been worked. The silver contains a fine proportion of gold. Even those mines which have formerly been worked are now abandoned. Some silver, however, is occasionally collected by the poor people of the place.

We proceeded farther to Huacaybo, or Huasacaibo, passing some finely-cultivated valleys. These regions abound in veins of all classes of minerals, some of which have been worked, but soon abandoned if not producing immediately large returns.

We reached the Huacaybo districts in one day's journey, and proceeded the following day to examine the famous copper mine a few miles distant from the place. We stopped at an old hacienda, erected by Don Adolpho, a German, who had formerly worked here a silver mine, and has now retired, a rich man, to the city of Mexico. The appearance of the soil and of the rocks in this neighbourhood indicated most unmistakeably the presence of great mineral wealth, particularly in the spot where the great copper lode appears in a most astonishing manner from an elevation of about 400 feet above the level of the river Urique, cropping out in masses at the surface, and, passing thus through the district, reaches the river, into the bed of which it plunges, and rises again on the other side to the height of about 1,000 feet on three successive hills, when it enters the mountain. It is visible throughout for nearly a mile, varying in its onward course from 7 to 10 yards wide. We examined the greater part of the lode, and took specimens from different places. The mine has never been worked, although small quantities of very rich grey ore have been picked out from the lode at its surface. The ore may be computed at an average of 25 per cent. in produce, and there are more than 100,000 tons visible where the lode crops out. After a few days' examination of this most important mineral district, we proceeded to Batoseágochic, or Batoseágachic, on the high road from Huahuachic to Cusihiurrachic. After visiting some smaller places, we did not think it advisable to push on much farther, although we had a great desire to see the famous city of Chihuahua; but our mules being lame and almost unserviceable, our provisions and necessities of life for such travels being exhausted, and our party being too small to face the savage Indians of the Apaches or Camanches—who infest the neighbourhood of the town on the high plains, but have not as yet penetrated into the interior of the Sierra—we were compelled to give up the idea of pushing our journey any farther to the eastward, and resolved to return to Choix by another road.

Before we turn southward, I will give some particulars about the population of Chihuahua, which I obtained here from official sources. It appears that the whole population of the state of Chihuahua does not exceed 200,000 inhabitants, which gives about 15 inhabitants to the square league. With the exception of mining and agriculture there is scarcely any industry in the whole state. In El Paso the inhabitants grow very excellent wines and spirits, which they send by caravan to the market of Santa-Fé, in the north, and to Chihuahua city. From the boundary lines of New Mexico down to the state of Durango, savage Indians infest the country, and prevent the settlement of Europeans, unless detached forts are established, and strongly garrisoned by soldiers of most determined character, and accustomed to Indian warfare. The number of these Indians is supposed to be from 30,000 to 50,000, consisting of the tribes of Chiricahues, Tontos, Gileños, Mimbrenos, Faraones, Mescaleros, Llaneros, Lipanes, and Navajoes, and Apaches. The Camanches principally inhabit Bolson di Mapini, and are about the most savage of the whole.

*Batosedagachic* itself is more in the interior of the Sierra Madre, and very near "Terra Caliente," or the low hot country of Sonora and Cinaloa. Its distance from the city of Chihuahua is about 110 miles. Several hundred mines exist in the neighbourhood of the town, and many others at different distances of 20 leagues: some of them are entirely on the surface, and many of them entirely untouched.

Of those near the town the following are worked at the present moment:—"Sangre de Cristo," whose ores contain  $4\frac{1}{2}$  marcs of silver in the "bulto" of three cargass, that is to say, 900 pounds. "Carmen,"—very profitable for the easy extraction of its ores, one single cartman being able to furnish 100 cargass per week, of which every carga gives a net profit of 2.50 dollars: these ores on an average contain 15 ozs. of silver in the "bulto" of three cargass, the expenses being from 3 to 6 dollars per "bulto." "Santa Rita," whose ores contain from 2 to 24 marcs per carga, the highest proportion reached at the depth of 70 varas when the mine was drowned. A tunnel (tiro) was begun for the purpose of drawing off the water, but we cannot tell whether it was ever finished or not. "Uruapa:"—this mine is not deemed very rich, yet the owner, Don Martin Salido, a man who began his mining operations without any capital, selling his silver at the low price of 7 dollars per marc to those who provided him with the funds, is now worth 60,000 dollars, and he has refused an offer of 100,000 dollars for his mine.

"Palmcrejo," a mine worked on a small scale by its owner, Mr. Unea, yields him a net revenue of 25,000 dollars a-year. This produce, however, could be greatly increased by the use of

other means, such as the appliance of water-power in the neighbourhood, at a place called Chinipas.

At a greater distance from Batoseágachic are the following :—

*Sententrion*, 10 leagues distant, situated on a little river. This mine is the property of Messrs. Isidoro de la Torre and Co., of Mazatlan, who own two-thirds of it, and of Mr. Arriola, who has the other third. The quantity of silver deposited here appears to be extraordinary. The vein is 25 to 30 varas thick, it extends for miles, and the mining operations can be carried on at nearly the surface. The ores have been proved to contain from 3 ozs. to 5 marcs in the carga; but even the poorest of them yield a net profit of 5.50 dollars to the bulto of 3 cargas, the mining expenses being most trifling. The owners calculate on extracting five hundred cargas every day, but the nature of the mine would allow of thousands of cargas being daily extracted. There is, however, one great difficulty at this place: the want of hands, the population of the neighbourhood being almost exclusively composed of Tarahumare Indians, a mild and honest race, but by no means well fitted for the serious and regular labour of a mine. The scanty and scattered population of the state of Chihuahua in general makes it difficult to provide for this want.

*Cerocálhuic*, 8 leagues from Sententrion, and 12 leagues from Batoseágachic. The silver of this place also contains a considerable proportion of gold. The population is composed chiefly of Tarahumare Indians, but, in many other respects, this place promises great success. Water power is near, and beautiful pine forests cover the neighbouring mountains; but up to the present no regular mining operations have ever been tried at this place.

*Monterde*, 20 leagues from Batoseágachic, and 90 leagues from the capital of the state. These mines were not discovered till 1841, and have not yet been regularly worked, though a number of "gambusinos" make a living here. The place is very far away from all communications, and the necessaries of life bear immense prices.

*Guadalupe y Calvo*.—This mining place is situated at the head waters of the Rio Culiacan, about 60 leagues south of Batopilas, and was formerly in a flourishing condition. Its principal mines were then worked by the English, South American and Mexican Company, who extracted from them in six years upwards of 6 millions of dollars' worth of silver. A mint has been established here by English enterprise; but it seems that, although the mine produced an enormous quantity of silver, the operation in itself was not as satisfactory as it should have been to the shareholders, owing to bad management. The ores now obtained contain from 3 to 9 marcs per carga. The mines which have been abandoned by the Mexican companies are now worked by Messrs.

Achoa and Holderness, who succeeded last year in getting out 100,000 dollars' worth of silver.

At the distance of about 70 leagues south-south-east from the city of Chihuahua, on one of the tributaries of the Rio Conchos, is a mining district whose centre is "El Parral." The number of mines around this place is very great. The district has peculiar advantages: the country is fertile, the population more dense, and labour cheaper than in any of the other mining districts of the state. The ores of these mines are of two different classes, some of them fit for cupellation, others for amalgamation. The latter are poorer, but as the process is cheaper, they are nevertheless the more profitable.

*El Parral* itself is a place of 7000 to 8000 inhabitants. Two different mines are to be mentioned here—San "Francisco del Oro" and "La Cruz." The ores of the first contain 2 marcs of silver in the carga of those fit for cupellation, and 2 to  $2\frac{1}{2}$  marcs in the bulto of 4 cargas of those fit for amalgamation; the latter are the more abundant. In the second mine, which is worked at the present moment, the ores of the first class have 12 to 13 ozs. in the carga, and those of the second class 16 to 18 ozs. in the bulto of 4 cargas. The process of amalgamation, as it is conducted here, takes 8 or 10 days.

*Hydalgo*.—At this place, which is 3 leagues distant from the Parral, a great number of mines exist; they are, however, all filled with water, with the single exception of La Cabadeña. In this the cupellation ores contain from 3 to  $3\frac{1}{2}$  marcs in the carga, the amalgamation ores from  $2\frac{1}{2}$  to  $3\frac{1}{2}$  in the bulto of 4 cargas.

As to the other mines of this place, they are all provided with tunnels by which, with small expense, the water could be made to flow out.

*San Diego*.—Among the mines of this place, which is situated at a distance of 2 leagues from the Parral, the most important are El Nopal, "La Veta Grande," "La Honda," "La Francesiña," "La Quebradilla," and "La Terrenates." Their ores, which occur in very considerable quantities, contain from 16 to 20 ozs. in the carga when fit for cupellation, and the same quantity in the bulto of 4 cargas when fit for amalgamation. All these mines are free from water, but worked only by "gambusinos."

After all these statements, we have finally to speak of the mines of "Santa Eulalia," whose immense yield of ores, notwithstanding their poor quality, has been the richest source of wealth in this state.

*Santa Eulalia*, a little town of 1500 inhabitants, surrounded by several hundred mines, is only 5 leagues distant from the town of Chihuahua, where ever since 1703 the ores have been transported for their metallurgical treatment, the situation of the mines themselves being rather unfavourable for that purpose. By the immense

wealth thus concentrated at Chihuahua, the population of this city, now reduced to 12,000 inhabitants, was raised at the time of the most prosperous state of the mines of Santa Eulalia to the number of 76,000.

In a space of 2 square leagues all the mountains of Santa Eulalia contain silver; more than 200 mines have been worked in these confines, and upwards of 50 of them have been sunk to the depth of 200 yards. Some of them are so extensive that one whole day will not suffice to see the different parts of one alone.

With regard to the immense amount of silver extracted from the mines of Santa Eulalia, the following statements will be found interesting. At the most flourishing time a contribution was raised of 2 grains of silver from every marc extracted, for the purpose of building two churches, one at the city of Chihuahua, the other at Santa Eulalia. They were built in a few years. The cost of that of Chihuahua was 600,000 dollars, of that of Santa Eulalia 150,000 dollars; and a surplus of 150,000 dollars of the money collected in this manner remained. The result of the contribution therefore amounted to 900,000 dollars, which corresponds to an amount of 14,500,000 marcs of silver, worth at the real value of that metal 145,000,000 dollars, extracted from the mines of Santa Eulalia in the course of a few years.

It cannot be supposed that the produce of these mines, rich as they were up to the last operations suddenly stopped by the expulsion of the Spaniards, should have retained the same ratio at all periods. However, the whole amount of silver which they have yielded, though it is to be divided over a number of about 130 years, will be found very great. In the year 1833 a census of this whole amount was made, and it was found to have been 43,000,000 marcs of silver, or 430,000,000 dollars.

Since the interruption of the regular mining operations in 1833, the inhabitants of Santa Eulalia have nevertheless almost entirely existed upon the produce of the unscientific and disconnected operations which are carried on in nearly all the abandoned mines of this country. In this manner these mines have continued to support a population of 1500 souls in the little town, and have contributed also to the maintenance of a surrounding, scattered population, which supplies the miners with wood, coal, provisions, &c.

The ores of Santa Eulalia do not generally contain much above 4 ozs. of silver in the carga. Two of the mines indeed, which are Guadalupe and Galdeana, have richer ores, containing from 1 to 3, and even 4 marcs; the mines called Santa Domingo and Santa Gertrudis contain ores chiefly composed of lead. These ores are called plomosas or ayudas; and a carga of this class of ores may be had at the cost of half a dollar.

Proceeding in a south-easterly direction, we visited many interesting mining places, until we reached at last, after a long and circuitous journey, the old and famous mining town of *San Pedro de Batopilas*. This town, which was very flourishing in the time of the Spaniards, is situated in a mountain gorge at the foot of the westerly ranges of the great Cordillera, on the river of the same name, which rises high up in the Sierra Madre, near the small mining villages of Loreto and St. Joaquim. The climate of Batopilas, although warm, is very healthy, and similar to that of Urique, which is at a distance of about 24 leagues, in a due northerly direction. The distance to Chois does not exceed 36 leagues in a direct line. The town itself, which formerly contained a much larger population, is far superior to Urique; there are many good houses and shops, and the ordinary provisions are much cheaper here. Wood is plentiful in the surrounding mountains. This was the only place in the Sierra, since we left El Fuerte, where we met Europeans, who had been attracted to it by the unrivalled rich silver mines which are in the adjoining mountains, and which had been almost all abandoned since the expulsion of the Spaniards. According to old documents of former miners, and to the testimony of the present residents and the most eminent foreign engineers living in Mexico, there exists no locality in the whole Republic where the silver is found in the native state in such large and rich lodes, and with such decided and reliable surface indications, as in Batopilas. The rocks of the district consist chiefly of very hard diorite and tubarite (a local term), and the lodes running through them in different directions are composed of limestone or calc-spar, intermixed with iron or copper pyrites and lead. The few resident Europeans who are now working some of the old abandoned mines, fully confirm the opinion of the Mexican inhabitants, and believe that to experienced miners this place must prove the most satisfactory spot for silver mining. Considering the scanty means they had at command at the beginning of their operations, they were all doing well and perfectly satisfied with their work. There are so many rich places for silver mining, partly abandoned and partly at work, in the whole province of Chihuahua, that very little importance is attached to a spot where the ground may be more or less favourable, particularly as those who come as adventurers to these very distant regions, far from the road of the ordinary commercial communications, have mostly so little knowledge of mining and other general experience, that when they return to the larger towns and seaports their reports of rich silver mines. &c., are not believed, and this circumstance, together with the difficulty of finding Europeans possessing some little capital, and willing to go 100 miles into the thinly inhabited districts of the north of Mexico, accounts for the reason why

these facts are not more known among the wealthier classes of South Mexico and in Europe. The Spaniards who worked in former times, before their expulsion, many mines in this locality extracted large quantities of silver, and returned to their country with considerable fortunes. The story of a miner of the name of Bustamente is particularly interesting, and still in the mouth of every Mexican in the place. Towards the latter part of last century he came to Batopilas, and by his perseverance and knowledge of mining realised, in a comparatively short time, a fortune of many millions of dollars. By his wealth he was able to assist the King and the Spanish Government with large sums, and in consideration of this he was created a noble by the King, and received the title of Marquis of Bustamente. He became by degrees the chief magistrate and inspector of mines of the whole district, and was much esteemed for his benevolence and impartiality. The year before we visited Batopilas a very rich silver lode had been discovered by a Mexican miner, who cleared a net sum of about 150,000 dollars in 6 months. This mine, called San Pedro, is now in the hands of his successor, Senhor Guadalupe Ramirez, and shows several very rich lodes of silver in the new workings, about 12 or 15 fathoms deep, and promises much larger returns than the first. M. Ramirez, and Mr. George Lebrun, an Englishman, who has also an interest in the mine, gave me some specimens, and stated that they had been offered 100,000 dollars for their mine, but that they would on no account part with it, as they expected to extract 400,000 to 500,000 dollars in less than two years. In another mine, situated on the other side of the river, and which had been formerly worked, Mr. Lebrun had just begun to drive an immense adit level—a tunnel some 10 feet high by 10 to 12 feet wide—in order to cut 18 to 20 large veins of native silver. The tunnel is to be 150 varas long, and will cost upwards of 100,000 dollars, but then the amount of silver to be extracted is estimated at several millions. This mine is called San Miguel; and the former owner, who died lately, was M. Mendazona. The principal hill of Batopilas is called “Animas,” in which more than forty rich veins are known to exist, none of which are worked at present. Another hill opposite the town is called “Nestor,” in which many rich lodes have been lately discovered. The principal mines abandoned, but still containing great wealth, are—La Cata, Al Vitrios, La Nevada, La Valenciana, La Pastrana, San Antonio, El Carmen, San Pedro di Guadalupe, La Primera.

Very recently a mine was discovered by a Frenchman, M. Clochard, who reached, at the end of six months, by great perseverance, and with but very few hands, a lode of native silver of extraordinary richness. I visited his workings, which were not more than 6 to 7 fathoms deep, and had a piece cut out of the



back, showing the width of the lode (about 2 inches), composed of solid native silver, for which I had to pay him one dollar per ounce, or the price of pure silver, on the spot. The specimen is now in my collection.

A Scotchman, Mr. Miller, who had only been a short time in Batopilas, where he had come quite by chance for trading purposes, was engaged in driving a level into an old mine, and had just succeeded in his attempt to come to silver ore when I arrived on the spot. Some parts of the lode contained very rich chloride of silver.

According to what we saw here and in other parts of the district, there cannot be a doubt that there is an immense field open for experienced miners, possessing moderate capital, and proceeding with prudence and economy. Success must be certain for them; and I hope the time is not far distant when these regions will become more known to Europeans.

At about 30 leagues south of Batopilas we came to the mining town of Morelos, where native silver is also found in large quantities. Although the workings are not so numerous here as in Batopilas, the padre of the town assured me that the district is equally rich in silver. The specimens taken out of one of the mines show as much pure native silver of fine grain and great richness, and are worth quite as much as their weight in dollars.

The red silver-ore, or *Rosclair*, the antimonio-sulphuret of silver, and also arseno-sulphuret of silver, are here found in large quantities, much nearer the surface than in the mining districts of Guanajuato; but as these mines have not yet been worked to any extent, we could not ascertain how much the lodes may increase in depth, and what are the chances of their continuing in richness: according to the natives and Indians they are as rich as those of Batopilas. About 20 leagues farther south of *Morelos* is the old mineral town of *Hidalgo*, also on the Rio Morelos, with several mines in its vicinity, but very little worked at the present time. After visiting other mineral districts of less importance in the neighbourhood, we proceeded in a north-westerly direction on our journey homeward towards Choix. On the 26th we passed the small village of San Miguel on the eastern side, and thence by the junction of the Rio Verde and Rio Morelos, and at the foot of a long range of mountains belonging to the Sierra Madre. Here we learned from the natives, who brought in specimens, that several large lodes of rich copper ore are visible in the neighbouring mountains in the district called Baquiniapan. From this place we passed the village San Juan de Dios, and reached the village of Calavas, situated on the north side, and at the junction of the river San Miguel and the Rio Urique.

Referring to the route marked on the map with a red line, I

must remark that mistakes can easily be made by persons travelling in these regions ; for the same river often bears different names, according to the different districts which it passes through. Thus the Rio Grande, running in almost a due westerly direction, is only known by that name from the village Calavas to the junction with the Rio de Chinapas, or Otero, by most of the Indians and Mexicans, although some of the *rancheros* and travellers would know it by its other denomination of St. Miguel, as it is called in the new maps. In the old maps the name of El Fuerte is used throughout its course. As for the different rivers, mountains, towns, and villages laid down in the different Spanish and English maps known to me, I have not seen one in which their geographical position was in accordance with my daily observations, and where the names of the localities were rightly spelled. In most of the maps the Rio Batopilas, which is formed by two small streams, having their source near St. Joaquin and Loreto, in the central range of the Sierra Madre, is wrongly designated or omitted ; and this is the case also with the Rio Urique, which takes its rise high up in the Sierra, in the district Huacaybo.

The Rio El Fuerte takes this name only at the junction of the Rio Chois with the Rio Grande, near Vaca. This circumstance accounts for the reason why the name of El Fuerte is given in the different maps to both of these streams coming from the interior, and forming afterwards the great river El Fuerte. It is likewise very difficult to lay down the correct name of the smaller villages and towns in the interior. Most of them are of the Tarahumare Indian origin, and are differently spelled by the common Indians and Mexicans, on whom the traveller has to depend for information. Only the higher classes can read and write, and this often very imperfectly. About 3 leagues from the village Calavas we passed the Indian town of Tubares, situated on the western shore of the Rio St. Miguel, now called Rio Grande. This town possesses a fine cathedral, built in former times by Spanish missionaries ; its inhabitants are all Tubar Indians. These Indians are very industrious, they cultivate their land to great advantage, and are very friendly to the Mexicans and foreigners. On the morning of 28th September we left Tubares. There being no boats or *bolzas*, we had to swim the Rio Grande, at a place a few miles above the town. We passed a fine plain planted with maize, and halted at a rancho, where we heard from the *ranchero* that some time ago the Indians had brought him from the neighbouring mountains a few stones, which he showed us, and which proved to be rich specimens of copper ore. The old *ranchero* told us also that in olden times several rich gold mines had been worked here by the Spaniards, who extracted the gold from large regular veins,

but that since their expulsion these mines had been abandoned, and their localities were now unknown. We continued our journey in a more westerly direction, and, after traversing this plain for about three hours, reached the foot of a range of mountains running north and south, which we had to cross in order to come to our destination—the mining district of Bahuerachic.

Since we left the central ridge of the Sierra our journey was mostly in the lower districts of the Sierra Caliente. The climate of Batopilas and Morelos is very healthy, and although very hot during the summer months, we found the heat far less oppressive and intense than in El Fuerte. We had now to descend several ranges of hills, from the summits of which we had an uninterrupted view of at least 20 miles. We passed the night in a rancho in the Barranca, where sugar-canes were growing luxuriantly in a district called Balojaque. From the ranchero I learned what I had formerly been told in Huahuachic, and in a rancho called El Rhodes, belonging to the family of Don Pancho de Viniegra. In a country some three or four days' journey farther to the East, entirely inhabited by savage Indians, several large caves exist in which a great number of skeletons, and bones and skulls of a gigantic race of Indians who lived here in former times before the Aztecs, are well preserved, and may still be seen. As it is very dangerous for a small party to penetrate into these caves, and as the few Europeans who now and then visit these districts are not prepared for such expeditions, this most interesting question for the ethnologist has still to be proved. In this part of the Sierra I saw several caves, the largest of which is called St. Nicholas, out of which a great quantity of saltpetre is annually taken and sent to Sonora, Cinaloa, and Chihuahua, for the manufacture of common gunpowder. The saltpetre is sold at El Fuerte at 3 dollars per arroba of 28 lbs., and the powder made from it at 6 dollars per arroba.

After leaving the Barranca we had to ascend a higher ridge of the Sierra, stretching to the north-west towards Cerocachic. Starting at 6 A.M., we reached its summit at 12 A.M. We followed the Cordon among the pines in the Sierra Fria of the Cordillera. The road now became so narrow and dangerous among rocks and precipices, that we had to send our mules down by another road to the great copper mine of Bahuerachic, which we could now see before us some 2500 to 3000 feet below. Judging from the apparent height at which we were, our elevation could not be less than 6000 feet above the level of the sea. We made the best of our way downwards, and reached the valley late in the evening. We were most cordially received by Mr. Knight, the present owner of this famous copper mine. With him were Mr. Carr, a mason, and Mr. Dobbie, the manager of the mines, both Englishmen. This being a holiday, and all the mines at rest, our arrival

created a great sensation on the spot. We exchanged some hearty cheers, and it was certainly most pleasing to meet some countrymen in the midst of the Cordillera, at a distance of more than 500 miles from Mazatlan. A fête was given in the evening, and all the miners with their families came, and kept up dancing, singing, and gambling, until late at night.

*Bahuerachic.*—The village itself is situated at about 24 leagues from Choix, and 2 miles from the copper-mine “Jesus Maria de Bahuerachic;” it contains from 500 to 700 inhabitants, mostly miners. Working at the different copper and silver mines of the surrounding district, they are, like most of the natives of these villages, very poor, and but rarely come into contact with Europeans, or even with the Mexicans from the lower countries. On the hill and in the valley near the mine itself, a great number of huts are erected, where some of the natives working permanently at the copper-mines are located; for nearly 3 miles the valley of the two small streams, which pass close to the mine, is here and there inhabited by “Carboneros,” who make charcoal for the furnaces, and have to fetch the wood from different parts high up in the Sierra. The underground work in all the mines is almost exclusively done by the Mexicans, who are very skilful in their way, and indispensable in the working of mines in Mexico, and only want good management and skilful foremen, to show them how to work a lode, when to drive levels and adits, and to sink the shafts. The only difficulty in working with Mexican miners is to be entirely dependent on them for keeping the whole of the works in constant operation. At the beginning of the rainy season when sowing takes place, out of 150 workmen usually occupied at the copper mines, not one-fourth attend to their work; this, coupled with the numberless church-holidays, during which the works stand still, proves a great waste of time, and often a serious impediment to the due success of a mining undertaking.

For this reason alone it would be well for any Europeans intending to work mines in Mexico to have also a small number of European miners, upon whom they could depend, not only for the regular work to be done, but also for protection, in case of a mutiny among the Mexicans.

The Indians of the Sierra do only the out-of-door work, such as bringing charcoal to the furnace, carrying the ores and regulus, attending to the mules, making roads, cutting wood, and bringing provisions to the mines. The different articles of commerce are brought to the mines from El Fuerte by arrieros owning from 200 to 700 mules, who take back the silver and copper to the coast. The charge for the carriage of a carga of 300 lbs. of copper from the mine to El Fuerte is 3 dollars.

The following day Mr. R. Knight showed us the smelting works.

There are six furnaces, built of adobes on the old Spanish system. They last about 12 to 15 days in good working condition, during which time they can smelt about a ton of metal a-day in each furnace, after which they want repairing or rebuilding. Each furnace is supplied with a large pair of bellows, worked day and night by Indians, who get 4 reals, or 2s. wages per day. A Mexican miner can make as much as 6 to 8 reals, or 3s. to 4s., by working underground. A new furnace has just been finished by Mr. Carr, on the Swansea principle, and three more will have to be built in a short time. However, owing to the want of coals, they do not work so satisfactorily as expected. The mines produced last year 4,000 quintals of regulus copper, 94 to 96 per cent., the quality of which is considered far superior to the Chili and Peru copper.

The mine itself is situate in a hill, at the foot of which the smelting works are erected; at this spot the main lode is very powerful, varying in size from 15 to 20 varas (yards), and forming here and there large deposits. The lode runs north and south, and is seen cropping out many miles from the mine. In the whole district for a distance of 5 to 10 leagues cross-lodes and branches, and branches of the main lode, are discovered every day, and there is no doubt that this spot is one of the most important in the whole Sierra for copper deposits. The lode itself contains some fine carbonate and very rich grey and red oxides. The average of the whole lode may produce ores from 18 to 20 per cent. of copper.

After remaining a few days at this mine, we started to inspect some other copper mines, situated in the neighbourhood, and on our road to Choís. They are all less important than that of Bahuerachic, but if properly worked, would, nevertheless, yield a good profit to their owners. About 4 leagues south-east of Bahuerachic we passed the mines of Mr. Arriola, whose rancho and smelting works are situated in a fine open valley, surrounded with mountains. One of the mines which he is working is but newly opened, and although the ores near the surface are very poor oxides, some very rich veins of grey and red oxides cross the lode, and appear to be similar to the main lode at Bahuerachic, being in a direct line with it. Mr. Arriola's other mine is a small cross-lode, imbedded in a very hard rock, and consisting chiefly of sulphuric and copper pyrites, in which, as he contends, there is a great deal of gold, and of which he gave me several specimens for my collection. The following day we bid farewell to Mr. Arriola, our friendly host, and to Mr. R. Knight, and continued our journey by way of Mocorivo towards Choís, where we arrived late in the evening.

We passed many places where our guide wanted to show us some new copper and silver mines; but after all that we had seen up to this time we were perfectly convinced that any one coming out here with capital for the purpose of working mines, need not be

afraid of searching in vain; he will have numberless mines offered to him, and must weigh cautiously the statements of the natives, and inspect carefully many mines before he decides upon working a particular one. The soil of the state of Chihuahua is rich in different metals. Gold, silver, copper, lead, iron, zinc, and manganese, exist in its mountains in very considerable quantities. Of these, however, only the first two precious metals are of importance in the present estimation of the natural wealth of the country.

The silver of the western part of the state, of the mines of the Sierra Madre and its neighbourhood, almost always contains a greater or smaller proportion of gold, which usually gives to the marc of the alloy a value of  $9\frac{1}{2}$  to 10 dollars, while silver of the common degree of fineness is paid by the mint of the state at the rate of  $8\frac{1}{2}$  dollars for 1 marc or 8 oz. Under a certain ratio, which is rather high here, the separation of gold and silver does not pay. The State mint has the monopoly of making this separation, and not only charges too high, but, moreover, retains the metal delivered to it for that purpose during a whole month, by which an immense amount of interest is lost.

Generally speaking, the state of Chihuahua consists of extensive plains, elevated from 5,000 to 7,000 feet above the level of the sea, divided by steep, rocky, porphyritic mountains in detached ridges and irregular groups, and by a few valleys cut into the deep alluvial soil of the plains. Along the western confines of the state, bordering on Sonora and Cinaloa, runs the chain of the Sierra Madre, which by no means forms the watershed between the tributaries of the Atlantic and Pacific, but is a broad belt of mountain-ridges decidedly on the *western slope of the continent*. The head waters of the Rio Yaqui, and of some other rivers, flowing in a westerly direction into the Californian Gulf, are on the high savannas bordering that belt of mountains *to the east*. These savannas are that part of the country where its plains reach their highest elevation. The little lake of Cerro Prieto, situated in these savannas, cannot be much less than 8000 feet above the ocean. Of these mountains none appear to exceed 9000 feet, their elevation above the general level of the country never being very considerable. To this the Sierra Madre forms no exception. None of its mountains in the confines of the state of Chihuahua, at least, appear to rise above the height which permits the growth of trees.

The Sierra Madre is nearly the only spot which grows timber, which consists of several kinds of pine. In the other parts of the country, pine, or indeed any timber, is exceedingly rare.

Stunted oak and the roots and branches of mesquite bushes are generally used for fuel. A few cotton-wood trees planted around

the towns, and along the course of some little rivers and brooks, are the only trees of any size to be seen for many hundred miles. Yet the country is well covered with vegetation; the plains and mountains are overgrown with grass and shrubbery, and some of the savannas, watered by fine lakes and surrounded by steep but green ridges, are the finest pastures which can be seen, having not exactly an Alpine character, but a beauty of natural scenery not less perfect and grand. There is, however, a remarkable difference of character between the vegetation of the eastern and the western parts of the country. In the first the grass of the plains and mountains is generally intermixed with thorny shrubs of different kinds belonging to the acacia or mimosa family, and several species of cactus and yuca, the whole forming what is called a chaparral, which, however, with the exception of the valley of the Rio Grande and its neighbourhood, is scarcely ever very dense, and never so much so as in some more southern parts of Eastern Mexico, where it is almost impenetrable. West and south-west of Chihuahua the chaparral disappears. On the high plains in the neighbourhood of the Sierra Madre the grass of the savannas is as pure as that of the finest cultivated meadows, while several kinds of evergreen, growing to the size and form of a vigorous old apple-tree, are scattered over the green turf of the mountain-sides and gorges, and hill and dale, standing in little groves, in patches, or like the trees of an orchard, imparting to the whole country an appearance of particularly cheerful beauty. On the first ridges, which skirt the belt of the Sierra Madre, the oak appears mixed with pine, till at last, in the interior of that chain, the former disappear before the exclusive dominion of the latter.

Such is the general character of vegetation in this part of Mexico. Its climate, which is healthy in an uncommon degree, and in some respects really delightful, is chiefly characterized by extreme dryness, at least in the eastern portion of the country, where the greater part of the crops are raised by irrigation. Here during the whole winter, till the month of June, clouds are seldom seen. Snow does not fall every year, and when it does fall it remains only a few days. Rains before the month of June are rare exceptions; and though trees and shrubs begin to thrive in March and April, yet the grass does not become green before June, when the summer rains begin, giving full new life to the whole vegetation for the rest of the year. During the summer the days are hot, but the nights are always refreshing. The winter is cool enough to have a bracing influence on the constitution; but even on the high plains near the Sierra Madre, in an elevation of more than 7000 feet above the sea, it is as mild as in Southern Germany or Switzerland. Apples and peaches grow perfectly well here, and

crops of Indian corn reach the highest perfection. The average price of this grain is about the same in this country as in the United States, but it is exposed to greater fluctuations according to time and situation, either freights being high, or some parts of the country being occasionally exposed to distressing dryness. The cold of the winter, however, is more severely felt here than in much colder but more civilized countries; glass windows, with the exception of a few houses in the capital, being almost unknown. To this want of a good shelter, and the still more severe want of suitable clothes, to which nearly the whole population is exposed, the many catarrhal diseases which occur at certain seasons, and sometimes assume a serious character, are to be ascribed.

Contrary to what is the case in many other countries, the mines of the state of Chihuahua are situated in localities favoured by nature. Those of the Sierra Madre are well provided with water, timber, and fuel, and fine crops can be raised close by, while the "terra caliente," or hot country, of the states of Sonora and Cinaloa is at a distance so short that all kinds of tropical and half-tropical productions can be had at moderate prices. In respect to water and wood, the mines of Santa Eulalia alone form an unfavourable exception.

Less favourable is the report which can be made in respect to the facilities afforded by the industrial state of the country. Good mechanics are hardly to be found among the natives. They work badly, slowly, awkwardly in the highest degree, and yet are very dear. Foreigners going into mining enterprises here would have to provide for that want by bringing mechanics and mechanics' tools along with them. The same would not be the case with the miners, the natives having sufficient experience in that branch to be useful; and what foreign miners would do better would be counterbalanced in most cases by certain disadvantages naturally connected with their introduction. In general the Mexican is capable of hard work if he finds sufficient inducement, and is well managed—but sufficient inducement and proper management are indispensable. The old Spanish laws which have been preserved are very favourable to enterprise, facilitating the acquisition of mines, and promoting the credit required for that part of the national industry in an uncommon degree. The facilities granted by them have been extended to foreigners without restriction.

Having now terminated my expedition into the interior of Chihuahua, I prepared for my journey down to Mazatlan—buying fresh mules, which we could get much cheaper here than in other parts of the country. We paid on the average 40 dollars for a mule, which we sold again for 50 or 60 dollars at Mazatlan, where mules were much wanted on our arrival after the rainy season. We also sold our rifles, and all other unnecessary articles, for



which a good price was paid. The road from here to the coasting port of *Novachista* is over undulating ground, and fit for waggons or carts of any description. Goods and copper are carried hence to *Novachista* at the rate of *three dollars* per carga of 300 lbs.—a distance of about 60 leagues in a direct line, leaving *El Fuerte* to the right, and *Cinaloa* afterwards on the left. During and after the rainy season, when the *Rio El Fuerte* is very high, the *Lima* or *Brazil* dye-wood, which is grown in immense quantities in this district, is carried down the river in flat boats and rafts to the mouth of the *Rio El Fuerte*, a distance of about 30 leagues, when the lanchas or coasting craft take it either to *Altata* or *Mazatlan* at half a dollar per carga; the price of the wood varies from about  $2\frac{1}{2}$  to  $3\frac{1}{2}$  dollars per carga delivered at the mouth of the river. The produce exported to Europe consists chiefly of silver in dollars, copper, and *Lima* wood. After preparing everything for our journey, we took our leave of Mr. Verneuil, our kind host and companion in our expedition to the interior, and on the 16th of October resumed our journey to *El Fuerte*, which we reached the same evening, the distance being only 15 leagues.

We called at once on Messrs. *Ibarra* and Co., the principal merchants of the place; here we found letters and news from home, which each of us looked for with the greatest anxiety, and received with equal pleasure. We remained here a few days in order to gather all the information relating to the trade and industry of the place, and to the silver and copper mines of the neighbourhood, of which Messrs. *Ibarra* themselves owned a great number; and, having crossed the river, proceeded to *Alamos*, another great town at a distance of 20 leagues on the road from *El Fuerte* to *Guaymas*, in the state of *Sonora*, the boundaries of which begin about 6 leagues from *El Fuerte*. *Alamos* is one of the richest towns of *Sonora*; it is situated on the south side of the *Rio Mayo*, and contains much finer buildings and streets than *El Fuerte*. Its industry is chiefly directed to the working of silver mines, of which there are a great many in the neighbourhood, and which have made immense fortunes for many of the inhabitants of this town. We had no time to inspect them, but were very desirous of obtaining some reliable information relative to the copper, silver, and gold mines of the state of *Sonora*. From here the road leads in a north-westerly direction to *Guaymas*, the principal sea-port of *Sonora*, which is at a distance of 60 leagues from *Alamos*, and from which port all the European and American manufactures are imported into the state of *Sonora*. Here I made the acquaintance of Mr. *Losoya* of *Hermosillo*, who informed me that the *River Yaqui* and all its tributaries carry gold in their sand, and that a great many silver, gold, and copper mines are known to exist all along the western range of the *Cordillera*; that the *Mayo* and

Yaqui Indians wash the gold whenever the rainy season is over, and bring it to the neighbouring towns. A great many silver mines are worked farther to the north, but the inroads made by the Apaches, who come down as far as this, have hitherto prevented the richest part of the country being properly explored.

After a short stay in this town, we returned to El Fuerte, and resumed our journey to Mazatlan by way of Culiacan, passing almost all the same villages and towns of which I have spoken in our way up to El Fuerte. In our passage through Culiacan I called again upon Mr. Mackintosh, and received some valuable information and specimens of silver and copper mines situate in the adjoining Sierra.

On the 12th of November we reached Mazatlan once more, where we met again with Mr. Knight, who had returned from his visit to Bahuerachic, and who invited us to remain at his house during our stay in the town.

Mr. Thompson, the English consul, congratulated us upon our safe return from our perilous expedition, and after giving him a summary description of the most interesting features of our journey, we received letters of introduction for the different cities which we intended to visit on our journey home. After much anxious deliberation as regards the safety of travelling through the interior, we determined to take the road by the city of Mexico, instead of returning by way of Acapulco and Panama.

We finished our arrangements and left Mazatlan on the 18th November, arrived in safety at San Blas, and proceeded on horseback on our dangerous journey through Tepic, Teguilla, Amatitlan, Guadalajara, San Juan de los Lagos, and Leon, until we reached Guanajuato, one of the oldest and most famous mining places in Central Mexico. We were most cordially received by Mr. Glass, the English Vice-consul, and also by Mr. Hockin, the manager, and Mr. Clement, the treasurer of the Anglo-Mexican Mint Company of that city, and had through them the opportunity of visiting the principal haciendas or smelting works, and the most important mines of the neighbourhood, as well as the mining place La Luz, a distance of 10 miles higher up the mountains.

Inasmuch as this part of Mexico, as well as all the provinces throughout which we travelled since we left Mazatlan, have so often been described by European and American travellers, who now and then come as far as Tepic, I do not attempt to give a very minute description of any of the towns or places which we passed through, particularly as the larger towns resemble much the continental places of the south of Europe. Guanajuato is an old business place, and has regular communication with the city of Mexico: we had therefore the comfort of proceeding on our journey in a clumsy but strong and well-built stage-coach, which was so far

a satisfactory change, inasmuch as we were getting tired of riding on horseback, although the shaking of these coaches afforded very little relief.

From the Tepic down to St. Juan de los Lagos we had always some travelling companions, who joined us at our hotel, and were exceedingly glad of travelling with foreigners, the road being so dangerous between this city and Guadalajara, that very few venture to travel alone, if they have property of any value with them. There was formerly a line of stage-coaches between Tepic, Guadalajara, and Guanajuato; but on account of its being stopped nearly every day by highway robbers, and the travellers forcibly deprived of everything they possessed, the company was obliged to discontinue the line, and travellers are compelled either to travel in caravans, on horseback, or in a private carriage, accompanied by a "conducta" of soldiers for their protection over such parts of the road as are reported dangerous. But very often it occurred that no sooner had the soldiers left their travellers to take care of themselves than they were attacked by a band of masked men on horseback, who were perfectly acquainted with the value and particulars of the property and treasure in the possession of the travellers, and who turned out to be no other than the very soldiers who had accompanied them a short time ago as an escort for their protection. The same care has to be taken in the mesons (hotels) where travellers have to pass the night, as the hotel-keeper is often an associate or a leader of a band of robbers. Even in the hotels belonging to the stage-coach company, travellers have to be very cautious not to show any treasure, as spies of robbers are constantly on the look-out in and about the hotels.

In most of the towns we had to pass we halted for a short time to visit the most interesting buildings, &c., but in Guadalajara we remained several days, as we had letters of introduction to some Spanish and German merchants, who afforded us every opportunity of looking into the social state of this great and rich city, the second metropolis of Mexico.

In St. Juan de los Lagos we remained five days to assist in the festivities of the great annual fair, which begins in the first days of December, and lasts for about ten days. On the road from Guadalajara to this place we met upwards of twenty American waggons, and thousands of mules laden with all kinds of goods, a great number of people on horseback and in vehicles of every description. Whole caravans of families came to the fair from a circuit of 100 leagues, partly to make annual purchases, partly as pilgrims, and partly to participate in the gambling which takes place here in a large fine building, called Casa de las Partidas, situated in the Great Plaza of this town. There are 18 rooms in this building, and each room is rented to a roulette keeper, or "a gambling

bank," similar to those establishments which are only still to be found in Hamburg, Baden, Wiesbaden, to the great disgrace of the enlightened German nation. More than 50,000 strangers fill the town during the fête, and European goods are brought hither from the eastern parts of Tampico and Vera Cruz, as well as from the western parts of Mazatlan and St. Blas, and the value of the goods which change hands during this time is enormous. Most of the German, English, Spanish, and French houses of Mexico have some clerk or representative there to conduct their business operations. On account of the great number of robbers and low characters who come to visit the place during the fair, 500 soldiers are generally despatched from Guadalajara and from Mexico to protect the foreign merchants and inland traders, but nevertheless the roads are very dangerous, and numberless robberies are annually committed even in the city itself without being properly prosecuted or prevented by the authorities.

At a distance of 20 leagues from this place we passed another town of the name of Lagos, which possesses a splendid cathedral, also a very large flour-mill, the machinery of which was brought from France at a great expense. It is worked by a water-wheel 15 feet wide and 20 in diameter, and the water has to be brought from a distance of about 10 miles. The total expense of the establishment was 300,000 dollars. Between this place and Guanajuato we passed the large but poor town of Leon, where we found the first telegraphic station communicating with the city of Mexico.

After leaving Guadalajara we were constantly travelling on the high plateau of Mexico, at an elevation averaging from 5000 to 6000 feet above the level of the sea, seeing the higher range of the Western Cordillera at a shorter or greater distance on our left. On leaving Leon, however, we approached closer to this great chain of mountain, and after passing the small town of Sitao we found ourselves at the base of the Sierra, which we had to ascend until we reached Guanajuato, which is situated at an elevation of about 7600 feet above the level of the sea, and 1200 above the valley of Leon. The small but very important mining place, La Luz, is still higher up, and at an elevation of 10,500 feet above the level of the sea. From the summit of some of the higher points near this place we had a beautiful and most commanding view of the plateau and the endless plain stretching itself north and south, but not being sufficiently acquainted with the geography of the country, and particularly with the direction of the leading chains of the Cordillera, we could not calculate the distances which our eyes could overlook: judging by the appearance of the city of Leon, a distance of about 25 miles, which seemed to us so very close beneath our feet, the radius could not have been less than 100 miles.

Our week's stay in the city of Guanajuato was one of the most pleasant times we enjoyed during the whole of our journey in Mexico. To give a fair description of all the mines, smelting and amalgamating works, which we visited, the "Resgattas" or public sales of silver ores at which we assisted, and the entertainments we were invited to, would require an amount of detail that I prefer not to enter into, as most of the particulars respecting these places are known more or less; but as souvenirs of the locality I received from several owners of smelting and reducing works several specimens of different kinds of silver ore; the collection of the Rosclair silver crystal of Messrs. Campus, Brothers, and Perez Galvez, surpasses everything I have ever seen in any museum in Europe.

Leaving Guanajuato in the stage-coach early in the morning we passed several smaller towns and reached Salamanca in the evening. The next day we passed through Zelaya and stopped once more at Guerretaro, where we arrived early enough to visit the principal streets, squares, and buildings of this busy and populous town. The following day we left at 4 o'clock in the morning, and had some shocking bad roads to traverse, until we passed late in the afternoon Guantitlan, from which place we could already see at a distance below the great snow-capped volcanos of Popocatepetl and Iztacihuatl, in the valley near the city of Mexico, where we arrived towards 6 o'clock. We remained in this great metropolis of Mexico several weeks, visiting the most interesting and important buildings and objects which Prescott's 'History of the Conquest of Mexico,' and the works of other great writers, have impressed on our mind so deeply, and which was one of the principal inducements for us to undertake so long and dangerous a journey.

From here we made excursions to Tacula, Tacubaya, Chapultepec, Guadalupe, and the famous and well-known mining districts of Pachuca and Real del Monte, where we passed our Christmas in a most agreeable manner with the family of Mr. Auld, director of the Real del Monte Mining Company. On account of the great number of English captains and miners who reside at Real del Monte with their families, this place reminded us strongly of our English homes, and made us almost forget that we were in a country so entirely different to our habits and customs in political as well as in private life. We inspected the great smelting and amalgamating works at San Miguel and Regla, visited the famous Barranca of the Rio Grande, and returned again to the city of Mexico, well satisfied with our visit, and the kind reception which was given to us everywhere.

After despatching our luggage and valuables by the "conducta," we bade farewell to the numerous friends to whom we had letters

of introduction, and started in a great stage-coach, not without the fear of being attacked on our road by robbers who infest the highways between the city of Mexico and Vera Cruz.

Nevertheless we reached this place in perfect safety by way of Puebla, Orizava, and Cordova, and embarked a few days after in the mail steamer *Trent*, for Havanna and St. Thomas, in each of which places the steamer stopped a whole day, affording us opportunity of seeing the last, and in many respects the most interesting points and countries of the tropical zone before we returned to our homes in England.

I close extracts of my Journal with a résumé of the different mining operations and enterprises which have been undertaken with English capital since the independence of Mexico.

### MINING IN MEXICO.

THERE is no subject in the world upon which public opinion in England is so much led astray as that of mining in Mexico; nor is it surprising that those who have been severe sufferers, from having invested and lost their money in mining speculations in that country, should have arrived at the conclusion that the stories of the early adventurers in Mexican mines were fables, and that to invest capital in such undertakings was but another word for losing it altogether. But were these gentlemen to visit Mexico, and listen to the statements which are rife in the mouths of the English residents there, and of the natives themselves, they would at once become convinced that the fatal result which has attended all the mining speculations in the Republic has been owing, not to the inferiority or worthlessness of the mines themselves, but to the extravagance, incapacity, and folly, which have characterised the proceedings of those to whom their interests have been confided, and which are unfortunately notorious throughout the length and breadth of the land.

Having recently returned from Mexico, I have become somewhat conversant with the subject, and have no doubt, from what I saw and heard, that the non-success of English speculators in Mexican mines may be traced to the following causes. In the first place, to a costly and cumbrous direction in London, the members of which, not being acquainted with mining matters, were incapable of checking the expenditure, or giving due value to the information of their agents in Mexico, and consequently permitted extravagant outlay, and received as gospel highly coloured statements, which a better knowledge of their duties would have enabled them to have limited in the one case, and taken *cum grano salis* in the other.

The appointment of the officers abroad rested with these boards of direction, and it is greatly to be feared that the selection rather depended upon the relationship or connexion which the applicant for employment might have to the members of the direction, than upon his fitness for the situation he was to fill. The board became the organ of communication between the agents in Mexico and the shareholders, the latter unfortunates believing all that was told them, and waiting with open mouths for the golden shower that was about to fall upon them, until they were at last told that all their money was spent, and that the mines of Mexico were worthless.

So much for the direction in London: and now let us take a peep at the second cause of failure—the management in Mexico. It appears to have been a fixed idea in London, that for a mining director in Mexico it was necessary to select, not a miner or man of business, not a person acquainted with the language and customs of the people—in short, not such a man as any indi-

vidual member of the direction would have chosen to dispatch on any private business of his own, but a man of no business ideas or habits, and quite incompetent to manage the large capital entrusted to his charge.

On the arrival of these agents in Mexico, mines were contracted for by them in every direction upon the most preposterous terms, the native owners not being slow to avail themselves of the glaring inexperience and prodigality of the new comers. Mines long before abandoned were let or sold at exorbitant rates, drainages were undertaken at a fabulous outlay, and a scale of living adopted and salaries paid hitherto unknown in the country. The result was that many of the mines proved worthless, from having been long before exhausted—a fact known to everybody except the newly arrived agents; and the directors in England, seized with a panic at the rapid disappearance of the shareholders' money, transmitted orders to retreat precipitately from the majority of their undertakings. In this step an equal want of knowledge and judgment was displayed, for good and promising speculations were indiscriminately thrown over with those notoriously bad, and examples are not wanting of many of these mines having since yielded enormous wealth to the native owners, who have followed up the operations of the English companies. The principal of these companies were four in number—

- The Real del Monte, with a capital of over a million sterling;
- The Anglo-Mexican, with a capital of one million sterling;
- The United Mexican, also with a million; and
- The Bolanos, with something less.

Of these, the only one that exists is the United Mexican.

THE REAL DEL MONTE fixed its locality in the district of that name, distant about one day's journey from the capital, and at once commenced to construct roads and outlay money in machinery, as if a profit in the mines was a secured thing. With many vicissitudes, but ending in an almost total loss of the original capital, this company managed to sustain itself till the year 1849, when the whole concern was sold to two capitalists in the city of Mexico for an insignificant sum, and was by them placed in charge of the same gentleman who had been latterly managing for the company—an Englishman of known ability and intelligence. Mark the result! By adopting a cheap and efficient method of reducing the poor ores, and being unhampered with a board of direction in London, this gentleman provided the means required to work one or two of the most promising mines on the property, and in the last three years has secured a net profit to the owners of some two millions of dollars, with every prospect of doing as well for some years to come. In this case, the mines which under the control of an English company left nought but ruin, became a source of wealth when once relieved of that incubus.

THE ANGLO-MEXICAN COMPANY commenced its operations in the district of Guanajuato, about 90 leagues north-west of the capital, and in Catorce, some 50 leagues distant from the city of San Luis Potosi.

IN GUANAJUATO, the principal mines worked were Valenciana and Mellado, on the great vein of that district; the mines in the district of Villalpando; those in the district of Monte S. Nicolas; and one in the then newly formed district of La Luz—all points within a circumference of 5 leagues of the city of Guanajuato. The story is the same as in Real del Monte—the capital of the shareholders was spent, and the mines were returned to their owners.

In Mellado, the works being carried on by the company were pursued, and in a few months a bonanza was cut which lasted over ten years.

In La Luz, another enormous bonanza was met with, of nearly thirty millions of dollars; and at the present moment the Monte S. Nicolas district is being worked with a fair chance of success.

At Catorce, the mines speculated were San Augustin and others, where enormous works were undertaken and in part carried out, and then the mines

abandoned. In San Augustin, a bonanza of unusual richness has existed for two years, and a steam-whim from England is being put up, to enable the native owners to reap fully the fruits of their energy and perseverance. Thus, in two English companies are shown proofs that the loss of money was not caused by the mines having been worthless, but from some radical defect in the management, which prevented their development.

The UNITED MEXICAN—the next on the list—commenced its operations with greater recklessness than any of the other companies. A central board of direction was established in the capital, and in the first years of its existence mines were taken, and highly paid local officers appointed in no fewer than twelve mineral districts of the Republic—Oaxaca, Temascaltepie, El Oro, Tasco, Pachuca, Guanajuato, Comanja, Zacatecas, Fresnillo, Durango, Jesus Maria, and Sombrerete. One by one were all these districts abandoned, with heavy losses, except that of Guanajuato, where the company still exists upon a very reduced scale. The mines in which it is interested are four in number—Rayas, Aldana, Jesus Maria y José, and Trinidad, but of these only one is actually worked by the company.

Rayas is a mine situated upon the famous Veta Madre of Guanajuato, and has yielded in its time a considerable amount of wealth. It was worked by the company up to the end of 1852, and, the contract having expired, was then returned to the owners, owing a debt to the company of 220,000 dollars. Should the mine ever yield profits, the debt will be paid out of them, one-third of them being pledged for that purpose; but in the last three years it has barely paid expenses, and the owners, who are now working it, being too poor to do it justice in the speculation, no very great probability exists of its paying off the company's claim. It is, nevertheless, considered to be still a good mine, and if furnished with sufficient capital, and that capital economically and judiciously administered, it might become a remunerative investment.

Aldana is a mine situated on what is probably an offshoot of the Veta Madre. Upon it about 130,000 dollars have been spent, chiefly in cutting the vein, since which scarcely any speculative works have been driven in it, but it has remained unworked in the possession of the company for the last six years. It is leased for a term of twenty years, one-half of which has expired.

Jesus Maria y José is on the celebrated vein of La Luz, and upon it some 250,000 dollars have been expended. At the present moment (Dec. 1856) it is producing about 300 cargass of ore weekly, which assays 8 marcs per monton of 3200 lbs. Spanish, and is worth (less the cost of reduction) some 900 dollars. The mine expenses are some 1500 dollars weekly, and, therefore, the concern is actually a loser of some 500 dollars to 600 dollars per week. The ores are reduced at the hacienda of Dolores in Guanajuato, rented by the company. The mine is rented for an indefinite period, at the option of the tenant.

Trinidad is also on the La Luz vein, and has cost the company some 150,000 dollars. It is underlet to an English gentleman residing at La Luz, and is under his control and management. In the beginning of 1855 it gave a small quantity of very rich ore, which soon died out, and since then it has been unproductive. At present all works in it are suspended.

It would naturally be supposed that the sad fate of the sister companies would have induced the shareholders of the only one left to insist upon a most careful and economical expenditure of the trifle that remains to them; but, nevertheless, we here see a direction in London, consisting of six or eight directors, a secretary, two clerks, a highly-rented house, porters, &c., and a direction in Mexico, composed of a director, sub-director, treasurer, and other officers, maintained—for what? To work a mine giving a loss of 500 dollars



a week! Can it then be wondered at that mines in Mexico have not paid, when such absurdities are allowed to exist in the eleventh hour?

I have been unable to ascertain the subsequent fate of the various mines abandoned by the United Mexican Company in the numerous districts worked by it, but judging inferentially from what occurred in the other companies, there is every reason to suppose that some of them have since yielded profits to the workers.

The BOLANOS COMPANY, the last of this unfortunate list, commenced operations in the district of the same name, and also in Zacatecas. In spite of bonanzas met with in Veta Grande, San Nicolas, and San Clemente, the concern ended in ruin; whilst one of the mines in which it was latterly engaged, the Bote of Zacatecas, has given splendid profits to two or three of the English owners, who originally contracted it to the company, and who have continued to work it to the present day.

Besides these four companies, there have also existed the GOLDSMITHS', the HALPUHUAHUA, the MEXICAN AND SOUTH AMERICAN, of whose proceedings in Mexico I have no data further than that their fate was similar to that of the others I have specified. I believe that the latter still exists, but works no mines in the republic of Mexico.

I cannot but think that this short and imperfect sketch of the English companies established in Mexico proves that which was stated at its outset—that their non-success is to be traced to their own extravagance and defective management, and not to a want of value of the mines of the country. That these mines have yielded enormous amounts of wealth is proved by the colossal fortunes acquired by almost all the leading families of the republic from this source only, among the most notable of whom may be cited the family of the Condes de Reglo, at Real del Monte; that of the Condes de Rul, better known as Perez Galvez; of the Conde de Valenciana, and of the Marquis de Rayas, all at Guanajuato; the Fagongas of Sombrerete, the Gordoas of Zacatecas, the Espinosas of Catorce, and various others of more or less note.

It is generally known and admitted that the mineral wealth of the country hitherto explored is but as a drop in the ocean, compared with the virgin mines which exist in every direction, only wanting capital and enterprise for their development. Had the enormous capitals supplied by the English companies been spent with even a reasonable share of prudence—had the agents dispatched by them been ordinarily careful in the selection of the speculations into which they entered—had economy been practised in the directions at home and abroad, the result would have been very different to what it has been; and instead of ruin and disgust, the speculators would have been in the enjoyment of wealth and prosperity, and the country itself a sharer in the advantage. Should mining enterprise again be directed to Mexico, it is earnestly to be hoped that the past may serve as a warning for the future. Instead of an expensive court of directors in London, let any new company that may be formed content itself with a man of business as its representative at home, with the title of secretary, or actuary, who might be overlooked by two unpaid auditors, selected from the body of proprietors, and going out by rotation each three months. Instead of a large house, with the paraphernalia of secretary, clerks, porters, luncheons for directors, and such like modes of spending money, let it be content with a decent office in the City, with one clerk to assist the actuary in copying letters or accounts—in short, let it abolish that hot-bed of favouritism, nepotism, and stock-jobbing, known by the name of a court of directors, and it will have secured one chance in favour of a happy result to its undertakings.

That advantage being gained, let the agents for Mexico be chosen with the greatest discrimination, making it a *sine qua non* that they should be acquainted with the Spanish language, have been accustomed to the details of business

in general, and especially to the management of finance; and even if they be theoretically acquainted with mining it would be better, although this is of less importance than the other qualities. On their arrival in Mexico these gentlemen would have to use great judgment in the selection of the mines to be worked, and they should be instructed to take good information from the most reliable sources before making contracts with the owners. When a favourable locality and a promising mine or mines may be met with, they should engage the services of one of the many excellent European miners who are resident in the republic, and who, being already acquainted with the lodes of the country, and the manners and habits of the native workmen, are infinitely superior to the best miners who could be dispatched from England. A house should be taken of moderate pretensions, and only such assistants engaged as might absolutely be required, again availing themselves of the European residents in the country, rather than fresh hands from England. The salary of these agents should be moderate, but as a stimulant to exertion they should have allotted to them an interest of so much per cent. on the actual profits realised. They should be instructed to furnish by every opportunity plain reports of proceedings, with maps of the interior works of the mines, and each three months a financial statement of expenditure, which documents should be exposed in the office at home for the information of the shareholders.

A capital of 100,000*l.* is more than sufficient for the working of four good mines, of which only one-half would be required for some time; there are many such mines, and the only requisite would be judgment in the selection and economy in the working,—in short, if the same caution, activity, and intelligence, were to be devoted to a company as is every day given to a private house of business, success would be almost certain. I cannot conclude without expressing a hope that the day will arrive when English capital will once more be devoted to the working of mines upon a sensible and business-like basis; and that Mexicans, forgetting past follies in view of the actual common-sense pervading the management of any new company which may be established, may cease to characterise any particularly foolish act by the expression—“*Loco como un Ingles.*”—July 8.

## II.—*Excursion to an Ancient Volcano in Mexico.\** By HENRY DE SAUSSURE.

Communicated by Professor PAUL CHAIX, of Geneva, Corr<sup>g</sup>. F.R.G.S.

Read, June 27, 1859.

To the south-west of the valley of Mexico stretches the verdant province of Mechoacan, deservedly reputed as the garden of the republic—a broken, undulating country, enjoying a temperate climate, and watered by numerous streams. When the traveller enters those fine meadows, after having long been tired with the sandy plains of Anahuac, and the marshy flats of Mexico, he feels particularly delighted at the sight of those wooded hills intersected by verdant plains, cool, refreshing streams, and smiling lakes,

\* In giving an account of our excursion to this mountain, I do not assert that it had never been seen by anybody, for it was well known by the people of the neighbouring district; but no traveller ever suspected its existence, and the inhabitants of the capital were in utter ignorance of it.

dotted with many islets, clothed in the most luxuriant vegetation. In other parts of that fertile country mountains of a more savage appearance conceal in their bowels those metallic treasures, the only remaining source of wealth of the Spano-American republics. The most flourishing of those districts is Angango, which borders on the state of Mexico on its eastern frontier.

I left the above-named place on the 6th of August, 1855, and travelled west towards the village of Taximaroa, avoiding as best we could the numerous bands of robbers which the revolution had let loose over the country. I had received obscure indications of the existence of a great mountain, called *San Andres*, in those parts, but could not easily procure a guide. That broken country is completely covered with forests, so thick as to preclude any distant prospect, and even the sight of the highest and nearest mountains; so that we could not see the *San Andres*, although we were assured it was at no great distance from Taximaroa. All the great mountains in Mexico rise with so gradual a slope, that from their base nothing is to be seen except the hillocks on which they rest.

It seems that a short trip might have carried us to one of the summits of the mountain direct from Taximaroa; but the Indians of that country are sunk into such a degree of obtuseness or apathy that it was impossible to sift any information out of them, and we were apprised afterwards that a whole day had been unnecessarily spent in marching round the mountain. It is no doubt owing to the sullenness of the inhabitants that the base of the volcano of *San Andres* has been skirted by former travellers without their being made aware of its existence.

The day was already far spent when our little caravan entered the vast forests by which the foot of the mountain is clothed. We were in the middle of the rainy season, and did not advance much before one of those tropical storms, which are of daily occurrence in the evening, burst upon us. Darkness overtook us in the middle of those endless solitudes, and our guide took advantage of it to slip from us, and vanish in the thicket. Being left to our own guidance in a critical position, we had nothing to do but to feel our way as best we could along a narrow and broken path, where our loaded mules tumbled at every impediment they met with. The moon, however, lighted us along for hours to a welcome glade, where we found a temporary shelter in a cluster of Indian huts. We were then apprised that, instead of ascending towards the summit, we had been merely travelling round its base, and that nothing better was left for us to do than to pursue that same course towards the north for eight leagues more. We were fain to do it; and, on arriving at the village of Jaripeo, we were greatly relieved from our troubles by meeting there several Frenchmen, who kindly assisted us in carrying out our projects.

The vast forests of oak and fir with which all the mountains are clad in Meehoacan might procure infinite resources to that country ; but the people want the most elementary industry. Ignorant as they are of the use of the saw-mill, not to mention the saw and even the axe, they do not use the fine timbers that lie at their doors for the building of log-houses, bridges, boats, or rural implements of any kind. They are incapable of making planks, and live in wretched Spanish hovels made of earth or stone, without windows, roofless and floorless. Rivers are merely forded. The rise of their waters often compels the troops, convoys of merchandise, and travellers to tarry for weeks on their lonely banks, and government messengers are frequently drowned with the mails. Nevertheless the whole nation, accustomed to endless patience, prefer submitting to those inconveniences, which they consider as a tribute unavoidably paid to nature, to establishing bridges or ferry-boats, which their laziness induces them to think achievements beyond their power. To men whose aim is not beyond avoiding starvation, the most necessary implements are unknown. I was therefore not a little surprised to alight, at Jaripeo, upon a cluster of houses regularly built with timber, well-fenced premises, and a large saw-mill at work. Wherever an European happens to settle he soon works a complete change upon the neighbouring country, and thriving villages are seen rising where his industry adds the least improvement to the savage ignorance with which old Spain had endowed her former colonies. Thus I had much cause of congratulation in having missed the right path ; for the kind owner of Jaripeo apprised us of his having set up, on the volcano, a sulphur-manufactory for the making of gunpowder, so much wanted in the neighbouring mines. Although I had been for several days very ill from fever, I did not hesitate to undertake the ascent of the mountain, being stimulated by the hope of finding there many interesting curiosities, and, leaving our pack-horses at Jaripeo, I started at daybreak in company with Mr. Peyrot.

All the volcanoes in Mexico are of easy access, and the ascent may be performed on horseback to a very great height on the gentle slope of their sides ; but they are so thickly overgrown with immense forests, that both the horizon in the distance and the top of the mountain are shut out of the view by immense heaps of decaying secular trees, sheltering a world of parasitical plants and animals. After having for a while enjoyed in high spirits the novelty and magnificence of that vigorous and gigantic vegetation, a traveller is not long, however, before he feels tired with its monotony. With the San Andres, which spreads over a vast extent of country, the uniformity is pleasantly relieved by extensive horizontal glades, which call to mind the dried-up basins of former lakes. Its slopes are broken by plains and clusters of parasitical

dome-shaped hillocks, rising by a succession of gigantic steps to a vast table-land, from which a rounded rocky summit is seen towering.

The narrow path which leads from Jaripeo to the sulphur-works winds about those impenetrable forests, sometimes wading through the marshy ground of the above-mentioned flats, and very often engaged in deep ravines and dangerous chasms. The body of the mountain is wholly made of a bluish perlstein trachyte, much fissured by an infinite number of veins of obsidian. This last stone occurs in dykes, so thick that in many places men and horses are literally treading upon volcanic glass. All the plains in the neighbourhood are of the same nature, being besides covered with basaltic eruptions, which have by innumerable rents broken through the ground during the eruptions from the volcanic mouth.

After a march of several hours, we came to a rocky amphitheatre, where the most curious scene broke suddenly upon our view. At the bottom of a funnel-shaped cavity was a circular pool more than a hundred yards in breadth, filled with dark and boiling water, from which clouds of mephitic vapours were seen rising. The sides of the amphitheatre are all around bare rocks, mouldering and whitened by these sulphureous vapours and the deleterious pool. The rocks are besides completely marked with streaks and irregular circles, red and yellow, while a narrow stripe of scanty vegetation crowns the upper part of the cliffs. The struggle of nature striving against deleterious emanations gives the place a sad and savage appearance. The pool of warm water in the centre is very likely of great depth, judging from the rapid slopes of its banks. It is from its bosom that sulphur is obtained, mixed with mud; and it next undergoes the process of purifying by melting. A few earthen hovels and a small factory have been built in that lonely place, to carry on the manufacture, in a part of the mountain better sheltered from the miasms by its distance from the lagoon. But the action of sulphureous gas is still powerful enough to change the clay of which they are built into various sulphates, especially alum, so that the buildings still crumble down from time to time.

The latter part of the day was employed in exploring several parts of the mountain, under the guidance of two Indians, and we found our way up to a higher valley by using the hatchet through the dense underwood of a forest surpassing anything we had previously seen in the mountains of Mexico, by the extraordinary vigour and majesty of its vegetation. The ground was covered with gigantic trunks confusedly heaped under the dense foliage of the living trees; and whenever we attempted to cross over those prostrated giants by treading on their bark, they suddenly yielded, crumbled to dust, and buried us under heaps of mouldering wood and a thick jungle of ferns and other plants.

For about half an hour our attention had been excited by a strange noise resembling the rush of a cataract in the distance, when we saw a powerful column of white steam, throwing up its fleecy clouds into the air with a violence which carried them above the tops of the fir-trees that clothed the slopes of the valley. On reaching the place whence the noise originated, we were struck with the grandeur of the scene which burst upon us. The ground rose in front with a slope, covered with blocks of stone resembling china, and an immense spout of steam rushed at the top to a considerable height from an opening resembling a well two yards in diameter. The same well gave vent to an abundant spring of boiling water, which flowed down the sides of the valley, divided into several streams. That phenomenon may be compared only with the Geyser in Iceland, and its results are the same. The waters discharged by the well cover the ground with a large quantity of siliceous matter which increases the size of the stones over which they flow; their surface is at first soft, like a kind of paste, and being hardened by time, takes the appearance of compact opal.

Other curiosities are still to be met with on the slopes of the San Andres. Not far from the steam-spouts, and in the same valley, another warm spring is seen issuing from several small basins, which seem to have been carved by the hand of man; but it is remarkable only for its temperature, being little inferior to that of boiling water.

We went on through the woods, following our Indian guides, gradually rising along the sides of the valley, and, within the narrow limits of half a league, we suddenly reached another deep chasm surrounded by banks so steep that they threatened to crumble down under the pressure of our feet. At the bottom of the hollow we saw a pool of muddy water in a violent state of ebullition. It was alternately swelling, then throwing up foaming floods of boiling mire, and subsiding again. The stems of several fir-trees, which had been precipitated into that cauldron from its steep banks, were actually undergoing the process of cooking, tossed about in the muddy pool like vegetables in a boiling pot. At the sight of that new volcano we could not help shuddering, and retreated precipitately from its banks, from which we might so easily have been hurled down and met a horrible death.

It is not unlikely that the San Andres has other phenomena worthy of being seen; but the traveller is prevented from exploring it easily by the impenetrable forests which clothe it. In a later excursion which I made from the sulphur-manufactory, I came to an extensive glade occupied by a lake of bitter water, doubtless fed by subterraneous springs. Nothing is more mournful than the appearance of that dark sheet of brackish water, notwithstanding the stately forms of the trees around, and the presence of a number

of stags, parrots, and aras to enliven it. I was besides seized with a fit of ague, which made it impossible for me to pursue my exploration of the mountain, especially the Cerro Grande, a summit that rises above the limit of trees. Having reached the San Andres, after numerous accidents, which broke all my instruments, I was thereby prevented from taking any measurements of its height, which I might at random suppose to be above 4000 yards. It is, however, teeming with so many objects of observation that I may be allowed to hope it will be visited by geographers and geologists, who will be able to fill up the blanks of this my first excursion. I must caution them against an error which might cost them much time, namely, that of mistaking the name of the volcano for that of any neighbouring place or village, which is very often the case in desert countries, where mountains and rivers are nameless, or borrow their name from a town—as it is indeed the case with the famous Pico de Orizaba, which is also very frequently named after another neighbouring city, San Andres, the Cholchicomula of the Mexicans.

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III.—*Some Account of the Lake of Yojoa or Taulebé, in Honduras, Central America.* By E. G. SQUIER, Esq., of the United States of America.

*Read, January 10, 1859.*

THE lakes of Central America are among its most interesting physical features, and, next to its volcanoes, most likely to arrest the attention of the intelligent traveller. The large and beautiful lake of Nicaragua, the *Cocibocca* of the aborigines, and its dependent lake of Managua or Leon, the first 120 and the second 60 miles in length, are those best known, principally on account of the facilities which they are supposed to offer in connection with the project of opening water communication between the Atlantic and Pacific Oceans. After these, we are best acquainted with the volcanic lakes of Masoya in Nicaragua, Ilopango in San Salvador, and Amatitlan and Atitlan in Guatemala. The lake of Itza, often called Peten, in Vera Paz, remarkable for its historical associations, has lately been visited and described by an intelligent traveller, M. Monelet, and has thus been brought within the range of modern geographical knowledge. Like Atitlan in Guatemala, and Masoya in Nicaragua, it is without an outlet; but, unlike them, betrays no evidence of volcanic origin. It is a closed reservoir, within which is collected the drainage of a considerable terrestrial basin; and in consequence of receiving the waters of a number of streams without any apparent outlet,

it is called by the Indians *Nohkukén*, rendered by the Spaniards *Beber-mucho*, i.e. Drink-much.

There is another Central American lake in Honduras, of which less has been known than of the "mysterious lake of Itza" itself. Although 25 miles long by 8 miles broad at its widest part, it never appeared in any map of Central America before that of Baily, published in 1850. This circumstance will indicate in some degree the imperfect state of our geographical knowledge of the country prior to that date, and which, I am sorry to say, has not since greatly increased. The lake in question lies about 75 miles to the southward of the Bay of Honduras, between lat.  $14^{\circ} 40'$  and  $15^{\circ} 5'$  N., and long.  $88^{\circ} 3'$  and  $88^{\circ} 15'$  W. And while Itza is distinguished as having no outlet, Yojoa or Tanlebé, the lake under notice, is equally remarkable from having several outlets. These are represented to be *ten* in number, one only being open, the others subterranean. In Baily's map it is represented as having five outlets, all open.

Our present information respecting this lake, although still incomplete, is derived from observations made in the month of February, 1858, by Lieut.-Colonel Edward Stanton, R.E., and the corps sent out under his command by Her Majesty's Government to verify the surveys for the projected Inter-oceanic Railway through Honduras, and from the examinations of Amory Edwards, Esq., of New York, agent to the Railway Company, who accompanied Colonel Stanton, and who afterwards, in July, 1858, made a second and longer visit to the lake, for the purpose of determining the truth of the popular stories regarding its extraordinary features.

As I have said, Lake Yojoa is about 25 miles long by from 5 to 8 miles broad, with an average depth of from 18 to 24 feet; and although distant but 45 miles in a direct line from the sea, it has an elevation above the ocean level, determined barometrically, of 2050 feet. It occupies the centre of one of those singular terrestrial basins, of which Honduras offers many examples, called, not inappropriately, *bolsones* or pockets. These are formed by the contortions of the mountain system of the country, the ranges of which frequently bend back on themselves, sometimes describing almost complete circles, and inclosing plains of varying extent and elevation. In these the waters of the mountain springs and rivulets are collected, often forming considerable rivers, which generally wind away to the sea through the narrow valleys which pierce the intervening and apparently unbroken mountain ranges. But sometimes they burst through the rocky barriers which impede their course, and after flowing for a while through deep *cañons*, between high cliffs, descend finally by a series of rapids and plunging cataracts to the level of the coast alluvions, where, unit-



ing with other streams of equally turbulent origin, they flow away silently and majestically, through vast forest solitudes, to the ocean.

The high plains or *bolsones* of Sensenti, Intibucat, Otoro, Comayagua, Tegucigaessa, Olancho, and numerous others of inferior importance, answer to this description. At some remote period it is easy to believe that most, if not all, of these were mountain lakes or reservoirs, which were gradually drained by the slow excavations of their outlets, or suddenly liberated from their imprisonment by some convulsion of nature. Evidences of such an origin are not wanting, but their enumeration is foreign to my present purpose.

The lake of Yojoa occupies precisely one of the mountain basins or *bolsones* of which I have spoken, formed by the lapping or coiling round of the true cordilleras, or dividing ridge of the continent, which in Honduras constitutes a singular knot of mountains, known, in its various parts, by the different names of Merendon, Selaque, Opolaca, San Juan, Montecillos, Miambar, and Santa Barbara. It is, however, between the mountains of Miambar on the south and east, and those of Sta. Barbara on the north and west, that the lake is situated. These mountains have an average elevation of between 5000 and 6000 feet above the sea, and of about 3000 feet above the surface of the lake, which they shut in closely, leaving only narrow belts of marshy land near the water, in great part overflowed when the lake is full during the season of rains. The inner declivities of both ranges of mountains are abrupt, not generally available for agriculture, and only here and there used for cattle ranges. The outer slopes of these mountains are nevertheless comparatively gentle, descending towards the rivers Humuya and Sta. Barbara respectively by a series of terraces, intersected by numerous streams flowing in deep and narrow valleys. A number of these streams, it will be seen farther on, take their rise in the lake, whence they are fed by subterranean channels.

In fact, Lake Yojoa has but one open outlet, namely the river Jaitique at its southern extremity, which, in very dry seasons, is itself dry, but which generally has sufficient water to admit of the passage of canoes. It flows from the lake through a low meadow for upwards of a mile, then enters a narrow valley among the hills which connect the mountains of Santa Barbara and Miambar, and, describing a semicircle in its course, descends rapidly into the river Sta. Barbara. Before reaching the latter, however, it receives the united waters of two streams, called the Rio Sacapa and the Rio Salala, both connecting with the lake by subterranean channels. The underground passage of the Sacapa is half a mile long, commencing about two miles from the lake, for which distance, like the Jaitique, this stream flows through a long meadow covered with rushes and coarse grass.

In regard to these streams, as well as in relation to the remaining outlets of the lake, I cannot do better than subjoin the account of Mr. Edwards, contained in his private itinerary, communicated to me in August last (1858):—

“On the 7th of February, 1858, when I visited Lake Yojoa, in company with Colonel Stanton, the river Jaitique (the principal and only open outlet of the lake) was full at Rancho del Toro, the place of embarkation being not less than 7 feet deep. On the 9th of May following, the period of my second visit, I found the river at the same point dry, the lake having fallen 8 feet in the interval. I was informed that within the preceding week the lake had risen a few inches in consequence of several night showers, the occurrence of which indicated the approach of the rainy season.

“Proceeding to the village of Sacapa, on the river of the same name, I obtained a guide and followed up the stream for a mile to its point of emergence from its subterranean channel. I found the water *bulging up* from an orifice in the lime rock, near the base of a hill, not steep on this side, and covered with tropical vegetation. Groups of bamboos, the roots of which are nourished by the gushing waters, droop over the orifice, which is about 20 yards across. The stream falls rapidly from this source, descending 200 feet in a quarter of a mile. A mile below it is 50 feet broad, and between 2 and 3 feet deep. The amount of water does not vary during the rainy season, when the lake is full—a circumstance which shows that only a fixed amount of water can escape from the lake through the subterranean channel. The course of the stream is south-west, until it reaches the Rio Sta. Barbara. At a place called *El Salto* there is a fall of 60 feet perpendicular over a ledge of rocks. The channel leading from the lake to the hills is through a meadow, and the water sets into it with a perceptible current. In this channel there are a number of deep holes, called *pozos* or wells by the natives, which may be the places where the water enters its subterranean passage; but their bottoms seem to be mud, and there is no visible rush of waters downwards, whence I infer that the principal part of the water must enter from some point within the lake itself. This is the only place at the southern extremity of the lake, except through the river Jaitique, where its waters are seen to flow from it, but there are probably numerous openings in its limestone bed, through which they find an escape.

“This is evident from the fact that, after leaving Sacapa, and crossing a range of hills, a spur of the Sta. Barbara mountains, I found another outlet, called Rio Salala, a quarter as large as the Sacapa, emerging from beneath the limestone hills in like manner. It unites with the Sacapa lower down, near the point called *El Salto*.

“Proceeding farther, and crossing several similar spurs of the

Sta. Barbara mountains, I came to a fourth outlet still smaller than the Salala, called Rio Agateca. After passing the considerable town of Sta. Barbara, going northward, following the course of the mountains which border the lake on the west, I reached a fifth outlet, half as large as the Sacapa, called Sezacapa. Farther on, between the towns of Gualala and Ylama, is a sixth outlet, the Yojon, as large as the Sezacapa. A seventh outlet, the Sesecate, of same size with the last-named, occurs  $1\frac{1}{2}$  leagues beyond Ylama. All of these flow into the Rio Sta. Barbara, the bed of which is about 1000 feet below the level of the lake.

"On the 17th of May I left the town of Yojoa, situated on the *camino real* leading from the port of Omoa to Comayagua (the capital of the republic of Honduras), to examine an eighth outlet of the lake, called Rio Blanco. This river flows out from the northern extremity of the lake, and looks more like an estuary than a river, with low and muddy banks, without perceptible current, and gradually narrowing until it terminates in a pond of water of about an acre area, situated at the farther extremity of the meadow. In this pond are three deep *pozos* or holes through which the water probably filters into the subterranean channels leading under the hills. When the lake is full, the water is 6 feet deep all over the meadow. The amount of water which appears to escape here falls far short of that which emerges 2 miles distant, where the river Blanco proper rises to the surface, whence I infer that there are other points where the water descends within the lake itself. The river after emerging falls rapidly, and a mile below the point where it rises falls 120 feet at a single bound.

"Two miles to the eastward of the Rio Blanco is a ninth outlet, called Rio Yojoa; and, on the eastern side of the lake, still another, a tenth, with the same characteristics of meadow and channel, with just sufficient current to show the set of the water outward. This makes its appearance after an underground course of 3 miles as the river Uri.

"We have thus *ten* outlets in all—one open and nine subterranean—for greater or less distances. In the month of April all the sources of this lake, even the great spring of Agua Azul, are dry, and the only water in this part of the country comes from this great mountain reservoir. From June to February more water enters the lake than can leave by its subterranean outlets, and the surplus is discharged by the open channel of the Rio Jaitique. As I have said the rain had begun to fall during the night at the time of my visit early in May, and the lake at once commenced to rise, so that on the 1st of June a small flow had been established in the Rio Jaitique."

Mr. Edwards adds that the lake derives its principal supply of water from numerous rills and small streams descending the inner slopes of the mountains of Sta. Barbara and Miambar. Its most remark-

able tributary, however, is the great spring of *Agua Azul*, or Blue-water, having its origin in a cattle estate of the same name, and entering the lake about midway of its length on its eastern shore. It is described as "an immense spring of clear blue water, 70 feet across, from which a stream flows into the lake equal in size with any of its outlets."

There is a considerable belt of low, swampy land at the southern extremity of the lake, the greater part of which is overflowed when the lake is full. Beyond the watershed, however, and in the neighbourhood of Taulché and San José, the country spreads out in beautiful plains and valleys of greatest fertility. Between these and Comayagua, the capital of the state, lies the high *plateau* of Siguatepeque, 3600 feet above the sea, from 2 to 8 miles broad, and 30 miles long. It is remarkably cool and salubrious, wooded with pines and oaks, fertile, and producing the fruits and cereals of the temperate zone in the greatest abundance.

This is the extent of our present information respecting this remarkable lake; and, while it is far from satisfactory in all respects, it cannot fail to arrest the attention of intelligent travellers, and thus lead to a complete exploration. It lies within a day's journey of the proposed Honduras railway, to the agents and engineers of which we are indebted for the imperfect accounts here presented. They will no doubt have followers in the undertaking of an equally inquiring spirit, who will be able to bring to the aid of their researches a larger degree of geological knowledge, which will probably do more to explain the peculiar features of the lake than any amount of topographical information.

It seems certain that the prevailing rock around the lake is the fossiliferous blue limestone, overlying the sandstone and the slates, and found crowning nearly all the hills bordering the line of the proposed railway from Port Cortez to Comayagua. Near the coast, in the mountains of Omoa, but of course of a much lower formation, are vast beds of pure white marble, brilliant in colour, fine grained, and compact. Beneath these is found a metamorphic sandstone. Altogether it seems that the mountains around Lake Yojoa are of the blue limestone alluded to, probably uplifted by volcanic agencies, of which the whole country shows extraordinary effects, and that the waters of the lake find their way through breaks and rents occurring on the plane where the limestone meets the underlying sandstone. In other words, that the lake of Yojoa lies in a great limestone basin, full of cracks and fissures due to volcanic convulsions, through which its waters sink to the upper surface of the sandstone, and here find their way through other or continuous fissures of the superior rock, until they emerge to light again where the sandstone itself crops out, and the limestone ceases.

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IV.—*Explorations in Ecuador in the years 1856 and 1857.* By  
GEORGE JAMES PRITCHETT, Esq.

Communicated by W. BOLLAERT, Esq., F.R.G.S.

Read, December 13, 1858.

THE interest recently excited in Europe towards the Republic of Ecuador by the adjudication of 4,531,744 acres of select and valuable land to its foreign creditors may make the more acceptable some data acquired during my residence of two years in that country.

Ecuador is situated on the west coast of South America, between 2° north and 5° south latitude. It is bounded on the north by New Granada, on the east by Brazil, on the south by Peru, and on the west by the Pacific Ocean.

As the limits of the Republic were not exactly defined at the time of the separation of Old Columbia into the three Republics of Ecuador, New Granada, and Venezuela (a mixed Commission being only then appointed for the purpose, which has never acted), and as, both on the east and south, the frontier is still in dispute with Brazil and Peru, no accurate information can be given on this head, further than that the latter boundary line is likely to be soon adjusted, as the attention of the Governments has lately been drawn to the subject by the foreign creditors in consequence of the Peruvian Protest, made in Quito, against the Act of Adjudication referred to.

A reference to the accompanying map will show the provincial divisions of the country as follows:—Imbabura, Pichincha, Esmeraldas, Manabi, Leon, Guayaquil, Chimborazo, Cuenca, Loja, and Oriente.\* It is naturally sectionized by two parallel chains of the Andes, which traverse it from north to south.

The centre division, being on an average level much more elevated than the others, possesses a most agreeable and temperate climate, ranging from 55° to 66° Fahr. in the shade, little subject to fogs and damp, and has been wisely chosen as the site for the principal cities and towns of the Republic, as well as for the large grain and cattle farms for the supply of the coast and warmer districts. The two other divisions on the east and west are covered almost entirely by dense and most luxuriant forest, a

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\* According to Villavicencio, the Republic is divided into three Districts,—1. Quito; 2. Guayas; 3. Azuay—subdivided, as follows, into Provinces:—

The District of Quito comprises six Provinces,—Pichincha, in the centre; Imbabura, to the N.; Leon and Chimborazo, to the S.; Esmeraldas, in the N.W.; and the Eastern Province, to the S.E.

The District of Guayas is divided into two Provinces, both on the coast, Guayaquil and Manabi.

The District of Azuay into two also,—Cuenca and Loja,—both to the S. of Quito.

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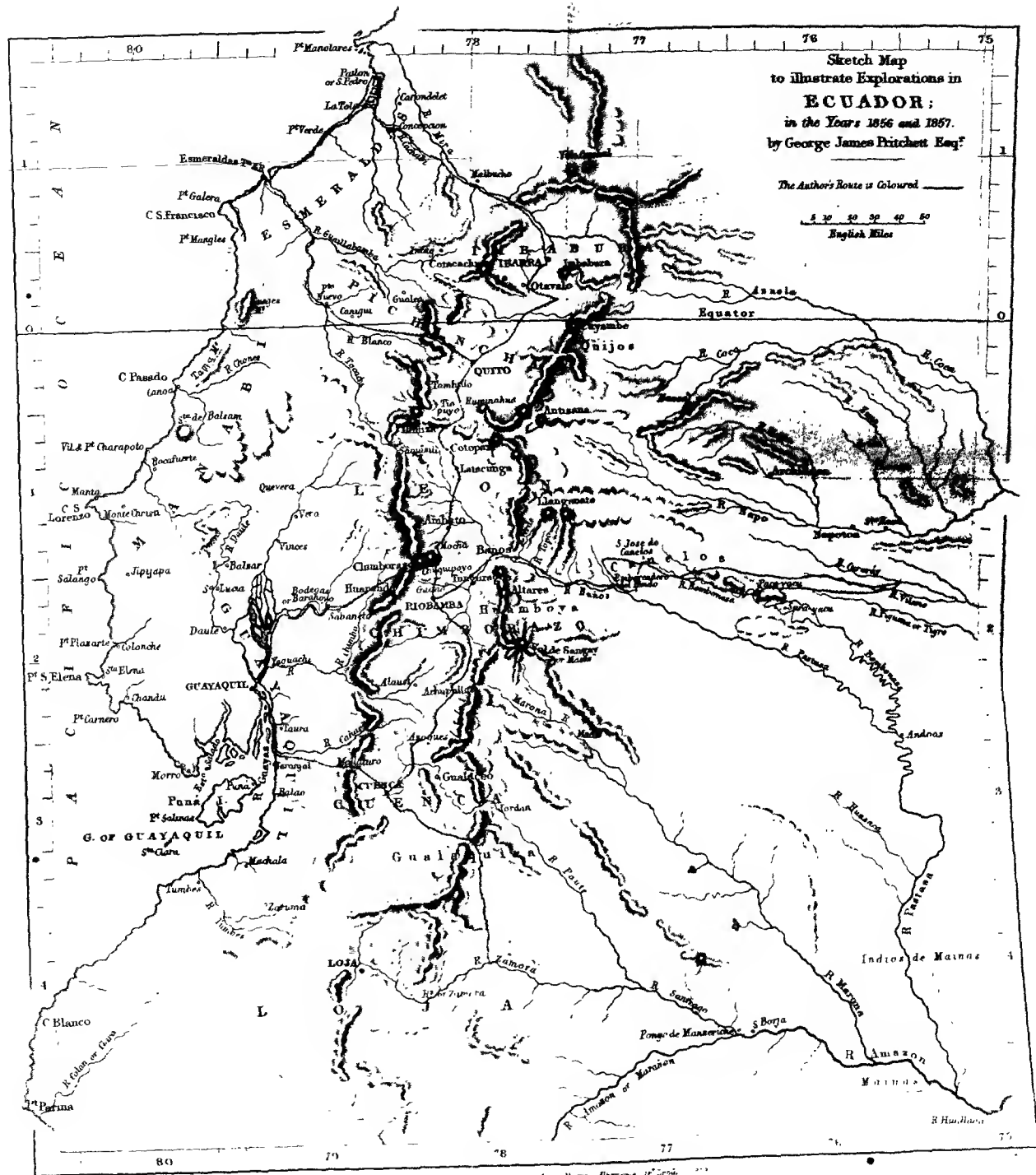
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very small part indeed of which has been rescued from the dominion of the monkey and wild boar, its present occupiers.

Guayaquil is the principal port, where may be said to converge the whole commerce of the country, and is a place of some activity. It is situated at about 60 miles from the mouth of the river Guayas, which flows into the Gulf of Guayaquil.

There are but few foreign houses established here. The road to Quito, the capital, is only open about six months of the year, and is distant 80 leagues or 240 English miles. To reach Quito the river is used for 50 to 65 miles, according to the season, whether wet or dry; in the latter to a point called Bodegas, and the former as far as Sabanetta. Such is the miserable state of the road and the limited number of animals available for the carriage of goods and produce, particularly the former, for the interior, that at these points there is always an excess waiting, in some cases for upwards of twelve months, before they are forwarded to their destination. It may be inferred that as Quito, as well as the other principal cities, is situated between the ranges of the Cordillera, one of these ranges or chains has to be passed in approaching it from Guayaquil. The point over which our present route lies is close to the celebrated mountain of Chimborazo, called Chuquipoyo, at about 10,000 feet above the sea. To arrive here, a series of lower mountains and ridges have been passed, which, after leaving the lower levels, where the river is navigable, present the most beautiful variety of form and colour, and of an extent that gives boundless room for every kind of atmospheric effect and beauty.

Before continuing this route to the capital, it will be well to state that the principal tributary of the river Guayas is the Daule, which unites with the former a little above Guayaquil. As the course of the Daule is not directly towards the Cordillera, its current is less rapid and its tributaries more numerous than they otherwise would be. It is navigable for launches and rafts a long distance up, and its banks are consequently occupied with cocoa, coffee, sugar-cane, and other plantations, on account of the great facility of transporting their produce to the port.

In the ascent towards the side of Chimborazo is situated the town of Huaranda, with a population said to be about 8000 souls. The traveller here changes the animals (mules or horses) he may have hired at Bodegas for others wherewith to continue his journey.

At this town goods accumulate (as mentioned at Bodegas), on account of this being the station where the coast-carriers meet those from the interior, and, as the journey of the coast is more easily accomplished than that of the Cordillera, or from the greater facilities between Bodegas and Huaranda, it will continue to be so.

It is only a personal experience of the state of the communication with the capital that can give an accurate idea of the enormous risks and difficulties attending the carrying on of the limited and almost totally undeveloped commerce of the country; but the wants of the interior must be supplied, and in return their own produce must be brought to the coast market, and the true measure of such necessity can only be estimated by the knowledge of the accompanying difficulties.

Before arriving at Huaranda, the forest-vegetation of the lower levels has disappeared, and undulating ground of grain and pasture lands has taken its place. About four hours' riding up a very precipitous ascent, immediately after leaving Huaranda, brings the traveller on to the high plain, on which is situated, at five leagues farther on, the tambo or resting-place of Chuquipoyo. This is the highest point of the road. It is subject at some seasons to storms of wind and snow which entirely stop the traffic. About five leagues beyond Chuquipoyo, at a considerably lower level, is Mocha, occupied, like Huaranda, by the owners of mules and horses for the traffic of the road.

Descending from Mocha, at a distance of five leagues is situated, in a warm, rich valley, the populous and busy town of Ambato, surrounded by orchards and small farms, and presenting the first specimen, and perhaps the best, of one of the communities of the interior. Number of population, from 9000 to 10,000. The neighbouring land, though arid and obliged to be cultivated by irrigation, is very valuable. Its weekly market is attended by numerous sellers of grain, cattle, baizes, blankets, ponchos, shoes, &c., of native growth and manufacture.

Ascending out of the valley of Ambato on to the plain, which is arid and barren, from which rises the active volcano of Cotopaxi, at a distance of 21 miles the traveller next meets with the town of Latacunga, the capital of the province of Leon, having the volcano in very dangerous proximity. The population is about 16,000.

The valley of Latacunga, lying north and south, has Cotopaxi in the chain of mountains which forms its eastern boundary. The western chain contains no mountain of celebrity. The valley is 12 leagues in length, dotted over with numerous villages, the principal of which is Saquisilí, celebrated for its woollen manufactures and the industry and energy of its inhabitants.

At the northern extremity of the valley, the road passes over a kind of connecting link between the two chains which form its eastern and western boundaries. The breadth of this link is four leagues; and, on descending into the next valley, at the head of which is the extinct volcano of Pichincha, a very different prospect gratifies the eye of the traveller from that afforded him in the

arid valley of Latacunga. The scene before him now is one of pastoral beauty; the bright green of the rich pastures is dotted over with cattle of every kind, and with the occasional large white farm-buildings and dwellings of the different estates. It may be imagined that such a scene, set in a frame of bold and beautifully tinted mountains, which momentarily vary as the clouds about them change their positions, is somewhat calculated to repay the traveller for the hard fare he has lately experienced.

On the side of Pichincha is situated the metropolis, Quito, our present goal—distant 8 leagues from where we entered the valley (this point is called Tiopuyo).

Quito has some fine public buildings, all of which are of the same period—the 16th century. The cathedral occupies one side of the principal square. Opposite to it is the Archbishop's palace, with private dwellings of modern and uniform architecture. The President's palace occupies the third side; and the fourth, opposite to the latter, contains only private houses, modern and uniform, of three stories. All the sides of the square, with the exception of that of the cathedral, have a colonnade, which serves as a promenade in wet weather. A handsome fountain occupies the centre of the square.

The churches are numerous, and some of them with the most elaborate ornamentation of figures, mouldings, cornices of every possible design, both in wood and stone.

The church of the Jesuits (who were banished some few years back) is a more modern edifice. Its interior is all gilt; such is the amount of carved work in it, that the general effect is destroyed, otherwise the form of the interior and the arrangement of the columns deserve a better fate.

The Convent and Church of San Francisco occupy one side of the square of the same name. They are raised above the level of the square, and have a noble terrace in front, from which, opposite to the church entrance, descends a flight of stone steps into the square. The buildings of the Franciscans occupy a space equal to four squares.

The Church of the Merced is quite an exception to the other ecclesiastical buildings of the city. In the first place, in the ornamental parts of the building there is an entire absence of gilding. The buttresses and pilasters on which the arches rest show an immense deal of labour in the representation of network which has been sculptured on them, and which has a good effect. White being the pervading colour of the interior, gives a good and better distributed light.

There are several other squares, each with its convent and church, among them being St. Domingo, St. Clare, St. Barbara,

and which occupy a very large space in the city, perhaps not less than one-fourth.

The population of Quito is said to contain, according to the last census, 80,000 souls. Of these a small number only are descendants of Spaniards, and the remainder half-caste Indians and a few foreigners. The agricultural population is entirely Indian.

From the unevenness of the ground no vehicles are used here ; but it is not just to lay the blame of this absence of carriages to this cause, as in the other cities of the country, where the ground is perfectly adapted for the use of wheeled carriages, the same absence of them is observed as in Quito. Some other reason must therefore be sought, and it will be found in the fact that the unskilled labour of the poor Indian can be obtained at the same cost, or less, than that of the horse or the ass, and that the laceration of the backs of either biped or quadruped has not arrived as yet at a degree to make the adoption of some other more humane means of conveyance imperative.

The high ground above the city affords a noble view of the surrounding country and the numerous snow peaks and volcanoes that are thence visible. The clearness of the air enables objects at the distance of 60 and 80 miles to be seen with wonderful distinctness. Among the snow-peaks are Cayambe, Cotacachi, Cotopaxi, Imbabura, Tunguragua, Sangay, Illiniza, and others. It has been seen how the capital has been reached from Guayaquil—that the high ridge of the Chimborazo has been passed, subject to the dangerous contingencies of snow and storm, when a drift might conceal in a few hours all traces of the weary traveller and his still more jaded beast. The first question, therefore, that would present itself to an explorer of such a country is, what is the necessity for such a long and difficult route? This was the first question that it became my duty to investigate, and, with this object in view, I determined on proceeding to the nearest point of the coast—the coast of Esmeraldas—in search of a port that might be made available for the capital, and whose distance was less than the present port of Guayaquil.

After passing some time in Quito, in communication with the Government respecting the object of my visit, I left the capital to explore the nearest convenient point of the coast which report had fixed upon as the most suitable place, considered merely as a port, and eligible, considered as a point that might be easily connected with the capital. A commissioner being appointed by the Government to accompany me, we proceeded to the city of Ibarra, the capital of the province of Imbabura, 20 leagues north-east from Quito, in order to collect provisions and Indians for a journey that

would occupy three months through the forest to the coast, where the necessities of life were sometimes not to be procured. This occupied a fortnight. The preparations being complete, we commenced our journey from the city of Ibarra coastward. Our course lay for several days parallel with the river Mira, a broad, rapid stream, which is, in some places, the boundary between this republic and New Granada, the level gradually diminishing as we neared the coast. The track we followed lay through dense forest. As we were going parallel with the Mira, we had to cross all the streams which flow into it on our side of the river, as well as the hills which form the ravines down which these tributary streams passed.

This was all uncleared forest, without path or road of any description, our only guide being the river, which we heard rushing over its stony bed on our right. The descent to the coast is very gradual, and favourable to the formation of a cart-road. That a road would be of the greatest benefit to the province of Imbabura need not be asserted. After eleven days of foot-journeying, we arrived at a point on the river Cachabi, where we embarked in canoes, and in four days reached the coast where is situated the village of La Tola.

In the year 1803 a Report was made by order of the King of Spain on the advantages to be derived by the opening of a road from the province of Quito to the port of La Tola (in the immediate neighbourhood of the Pailon) as regards the trade of said province with the coast of Chocó and Panamá. The King at the same time, in order to encourage the transit of goods by this route, allowed them to enter the country free of duty, besides other facilities favourable to the development of this province.

The Report made to the King was most favourable, but his Majesty had matters of greater importance to him to attend to nearer home, and the road, which was intended as a kind of base line for developing the luxuriant province of Esmeraldas, was never made.

The steps taken by the King were not entirely without effect, for the road has been opened to at least half way; but, unfortunately, this was of almost no benefit, for the road being incomplete, the motive for traffic was not offered, and in a short time it became grown up and absorbed into the general forest. A French company has since endeavoured to obtain a contract with the Government for the construction of this line of road, with stone bridges, and suitable for all the purposes of an active commerce, for merely a small grant of land on each side of the road. The Government of the day thought fit to decline entering upon the contract proposed, and the consequence is, the road to the coast of

Esmeraldas remains unmade, and the important and lovely province of Imbabura undeveloped.

Dr. Villavicencio, in his recent 'Geography of the Ecuador,' says:—

"The province of Esmeraldas, though most advantageously situated on the coast, surrounded by rich woods of valuable timber for all useful and ornamental purposes, with a soil from which the richest harvests may be gathered, is in the most backward and miserable condition, attributable to the want of means of fomenting its agriculture, and also roads for the cheap transport of its products.

"If, in spite of all these obstacles, the plantations of tobacco supply a considerable quantity for exportation, what may not be expected when experienced settlers clear its woods, multiply its plantations, and take advantage of its maritime position, its navigable rivers, and the ease with which these parts might be connected with the most important of the cities of the interior?

"Of this part of the coast of Esmeraldas, the most eligible point for a port is the harbour of the Pailon, called, in the survey made by Captain Kellett, of H.B.M.S. *Herald*, 'San Pedro.' This survey was made at the special request of the British Minister then resident in Guayaquil. It will be seen on the map 60 miles to the north-east of the river Esmeraldas."\*

I now returned through another part of the forest to Quito. My next point of interest was the bark country, lying between the province of Cuenca and the river Amazons. The point we reached on this occasion is called Gualaquiza, about 30 leagues from the city of Cuenca, where bark is purchased from the Indians of the district, who give it in exchange for trinkets and other trifles. A palm straw for making the fine hats, as in Guayaquil, is collected here. To arrive at this point the eastern chain of the Andes had to be crossed. On account of the trade that was going on in

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\* The Pailon of San Pedro, or St. Peter's Cauldron, was surveyed by Captain Kellett, of H.M.S. *Herald*.

A copy of the Survey was presented to the Equatorian Government, and this point being deemed eligible for traffic, the Legislature granted a Decree, authorizing the entry of foreign goods into the country at this port free of duty for a term of years.

The Pailon possesses many advantages over Guayaquil as a port for the metropolis, inasmuch as it is at less than half the distance from the latter, and would not have the drawback which the Guayaquil road suffers, of being impassable for six months of the year.

That this point would rapidly rise into importance cannot be doubted, when the quantity of rich and fertile lands of the neighbourhood and interior is considered, the produce of which has to make the tedious journey round by Guayaquil, to be there shipped for the markets of Chocó and Panamá. It would serve also as the outlet for the beautiful province of Imbabura and neighbouring provinces of New Granada, which at present have no port.

this direction in bark, it was practicable to make this journey with mules, though with the greatest difficulty.

On returning to Cuenca I proceeded to the coast to the port of Naranjal, about 28 leagues, by the usual road, the imminently dangerous character of which I will not attempt to describe: suffice it to say, that the experience of its road accounts perfectly for the benighted and prejudiced state of this, the most backward province of the republic.

Having returned to Quito again by way of Guayaquil, I left to examine the justly celebrated district of Canelos, situated on the north side of the river Pastasa. This river is navigable for 300 tons steamers to within 150 miles of Quito, so that it may be said to be more accessible on the eastern or Amazonian side than by way of the Pacific.

On arriving at the little town of Baños, the nearest to this part of the forest, and located in the break which the great chain of the Andes seems to suffer here, I had the great pleasure of meeting with an English botanist, Mr. Richard Spruce, who was on his way from the Amazons, on which river he had been engaged in researches for many years. I was the more gratified with meeting this gentleman, as he most kindly gave me some of his notes on the points I was about to visit. The following are some of them:—

*Baños, 5th December, 1857.*—Respecting climate, he says, “To speak more explicitly of the climate, I may premise, that in the months of April, May, and June (1857), I travelled from Tarapoto in Peru (lat.  $6\frac{1}{2}^{\circ}$  s.) by way of the rivers Huallaga, Marañon, Pastasa, and Bombonaza to Baños in the Ecuador, where I now write. As I neared the Equator, I remarked, as I had done in ascending others of the northern tributaries of the Amazons, what I may call the fusion of the wet and dry seasons. Thus on the upper Rio Negro, where I resided three years, almost on the actual Equator, rare was the day, all the year round, which passed without more or less of bright sunshine, and equally rare without rain. The same seems to be the case on the upper part of the river Bombonaza (Canelos). At the Indian village of Paca-yacu, which is reached in a day from Canelos, I was kept waiting three weeks for peones, and in this time made some observations on the climate, of which the following is a brief abstract.

“The mornings generally broke clear, and from  $5\frac{1}{2}$  to 6 o'clock A.M. the whole range of the Cordillera was visible from the volcano of Macas (Sangay) on the south to Cotopaxi on the north, with the intermediate snowy summits of Los Altares, Chimborazo, and Tunguragua. As the sun rose, volumes of mist came rolling up the valleys from the east, and speedily obscured both sun and landscape. About 9 o'clock the mist cleared away, and the sun

looked out bright and hot, but the heat rarely became inconvenient even after midday. At 3 P.M. we had a heavy shower, but the evening was again clear, and the view of the Cordillera more or less distinct. Less frequently we had rain in the morning instead of the mist, and then the afternoons were dry. The temperature of the air during this period was delightful; the minimum, at 6¼ A.M., was generally 68°, and until noon I could take vigorous exercise in the open air without being oppressed by heat. The thermometer attained its maximum at from 2 to 3 P.M.; once it rose to 87° Fahr., but more frequently it did not exceed 81°. When there was rain in the morning the thermometer did not reach 80° throughout the day. Gentle easterly breezes from 9 till the afternoon shower tempered the heat of the solar rays; but we had no violent winds, although the village stands on an elevation 240 feet above the Bombonaza.

"A more important matter than agreeable temperature is healthiness of climate, and you have had ample experience of how one may travel the whole day through the forest of Canelos, soaked with rain, and sleep soundly at night, protected from the damp ground by a few palm-leaves strewn over it, and from the night-dews by the rudest covering extemporized for the occasion.

"To speak now of the gold. From my own observations, and from the trustworthy information of others, I can confidently assert that the lower alluvial slopes of the Andes, which gradually subside into the great Amazonian plain, *all contain gold*, from the sources of the Napo, on the north, to the Marañon, above the Pongo de Manzeriche, on the south—perhaps nowhere in very great quantity, but still *amply sufficient to be worth the trouble of working*.

"In my voyage hither we began to encounter beaches strewed with pebbles of granite and quartz, at a little less than half way up the Bombonaza, on the ridges and in the valleys; the pebbles gradually became larger and more numerous as we ascended, and were always accompanied by gold. In fact, throughout the Upper Bombonaza you can hardly scrape up the quartz gravel to the depth of a foot without encountering small fragments of gold. Near those streams where gold is known to be most abundant, the loose, wet gravel extends to a great depth; through this the larger pieces of gold percolate by their own weight, and I have no doubt are to be found if searched for; but as the Indians only wash the surface gravel, scraping it up merely with their hands, it is not to be wondered at that they rarely find a nugget.

"It would undoubtedly be worth while to explore the mountain Llangañate, from the snows of which comes down the turbulent Topo, where rocks with quartz-veins, and even blocks of pure quartz, are copiously strewn. The tradition that gold has been



got out of this mountain in the time of the Incas is so universally diffused that it can hardly be altogether without foundation.

"The wild Indians scattered through this part of the forest weave their cushmas (long, narrow ponchos) of cotton grown by themselves, and they are stronger than the stoutest unbleached cotton I have seen in England.

"The shores of the Bombonaza, about Paca-yacu, are at exactly the same height above the sea (1500 ft.) as Tarapoto, in Peru, where an arborescent species of *Gossypium* is abundantly planted, and yields a cotton of the strongest fibre I have seen in any part of the world. No doubt this same species could be cultivated to any extent on the Bombonaza."

The other products of the forest are numerous and valuable, fully justifying the opinion expressed by distinguished naturalists, that it is the finest country in the world.

Mr. Spruce has mentioned the mountain of Llangañate as worthy of exploration. In it are the sources of the Curaráy (a tributary of the Napo), the Bombonaza, Tópo, Verde, Shuña, and many other rivers, whose shores show quartz and gold.

Dr. Villavicencio mentions it in his recent *Geography of the Ecuador*. Alluding to the Spaniard who became suddenly rich, and who used to make various trips to this mountain, he says:—

"Two reasons there are for suspecting that what is traditionally reported of this mountain is not entirely false:

"1st. The tradition still exists of the Spaniard whose extraordinary change of fortune surprised those who knew him in his poverty, and his continuous trips to Llangañate.

"2nd. At the time of his death, what motive could he have for falsely asserting that Llangañate contained immense riches, and that his had been acquired there? We confess to a belief in his statement. His confession was duly attested and registered in the archives of the city of Latacunga, by order of the King of Spain, who forwarded it there for the purpose."

Some years ago Dr. James Taylor, whose intimate acquaintance with Ecuador is the result of many years' experience, and who is at present resident in Riobamba, 12 leagues from Baños, wrote a memoir on the Eastern Gold-fields of the Andes, in which he expressed his opinion of their great importance and immense extent. He wrote from personal experience. Subsequent discoveries are now confirming what seemed then to be speculation and surmise.

The gold of the Bombonaza is always accompanied with a very large quantity of black sand, which, according to the assay of the sample by Messrs. Johnson of Hatton Garden, "is a valuable magnetic iron ore; and if wood were close at hand to work it, would produce a very fine quality of iron, being quite devoid of sulphurous particles, which is the secret of the Swedish iron."

The break or opening in the chain of the Andes, in which Baños is situated, is nearly equidistant from Ambato and Riobamba (the capital of the province of Chimborazo). Rivers from each of these places find their way down to the Amazons by this route, contributing their share to the Pastasa, which is among the largest of its tributaries.

The point on this river to which the navigation by steamers, of 4 to 6 feet draught of water, is practicable, is about 50 miles below the town of Baños, and at a distance from Pará, at its mouth, in long.  $50^{\circ}$  w., of 3000 miles—far exceeding the length of free navigation of any other known river.

At present there is a monthly line of Brazilian steamers, of 500 to 1000 tons, on the Amazons to a place called Nauta, within the limits of Ecuador, which serves entirely for the supply of the interior of Peru, and for the transport of its produce to the Atlantic, which would otherwise be lost or valueless.

The manufacturers of Great Britain, it would seem, could not fail to be interested in a country that yields cotton of the description mentioned by Mr. Spruce—of healthy climate, agreeable temperature, accessible by steamers, and of easy settlement. It is greatly to be regretted that so much energy and capital are being expended in the interior of Africa in search of suitable sites for extending the produce of this most important element of manufacturing industry, while the boundless fields of Canelos lie neglected and waste. It would be well were it generally known how little a settler in so mild a climate as this has to go through before he is in possession of all the requisites of a comfortable home.

In North America the hardships and privations of the new comers are notorious, and in many instances very severe.

Attributable to the great ease with which the Indians supply themselves with provisions, whether of fish from the rivers or game from the woods, are the continual feuds and dissensions that exist between the different tribes.

It need not be mentioned that the Ecuador is the favourite field of botanists, who do not allow the want of roads to be an obstacle to their researches, for where the track ceases the ardour of the botanist incites him to continue his work on foot, indifferent to increased tax on his powers of endurance. This accounts for more information being obtained of the Ecuador, in respect of its botanic wealth, than of its mineral riches.

As to its minerals, though sufficient has accidentally been brought to light to prove that the richest ores of silver and copper do exist in it, yet the time has not arrived for foreigners to systematically engage in mining speculation; till when, there is small hope of any accurate knowledge being obtained of its minerals. All that can at present be said of this branch of its wealth is, that the Cordil-

leras of its neighbours on the north and south have been proved by experience to be rich in silver and copper ores, which have been extensively worked: the mining districts of Pasco, Puno, and Potosí are sufficient proof of this. And surely the inference may be drawn, that this torpid and roadless country is as capable of a prosperous development as any on the Pacific shore, and the more so when its recent discoveries, both of native and ruby silver, are considered.

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V.—*Notes of a Voyage up the Yang-tze or Ta-Kiang, from Wusung to Han-kow.* By LAURENCE OLIPHANT, Esq., F.R.G.S.; with Chart of the River by Captain SHERARD OSBORN, R.N., F.R.G.S., &c.

Read, March 22, 1859.

ALTHOUGH the expedition up the great river of China, popularly known as the Yang-tze-kiang, from which the British embassy to that empire has just returned, was undertaken in pursuance of a policy of which this interesting event forms the concluding episode, it was a source of great gratification to those engaged in it to feel that its geographical value was fully equal to its political importance, and that while employed in farthering the interests of Great Britain in this quarter, they might also incidentally be the means of rendering some service to the great cause of geographical discovery.

It is, however, to the naval officers, upon whom the execution of this difficult and arduous enterprise devolved, that the credit is due for having brought it to so complete and successful an issue.

It is scarcely too much to assert that the ascent for the first time of an unknown river, for a distance of upwards of 600 miles from its mouth, in a ship of 1300 tons, and drawing 16 feet of water, is an achievement which has never been surpassed in the annals of internal navigation or river exploration.

It is impossible to estimate too highly the skill and energy of Captain Sherard Osborn, a valued Fellow of the Society, or the unwearied assiduity and indefatigable exertions of the Master of the *Furious*, Mr. Court. Doubtless the Arctic training of both these officers stood them in good stead.

Of the services of Captain Osborn in the Arctic regions it is superfluous to speak; of Mr. Court it suffices to say that, as Master of the *Investigator*, he performed the North-West passage with our gold medallist, Sir Robert M'Clure.

As, in addition to the absence which existed of any information with reference to the breadth of the river, or the nature of its channel, it was known that some of the principal cities on its banks

were in the hands of rebels, and its defensible points were reported to be strongly fortified, it was deemed advisable that Lord Elgin should be accompanied by a naval force, sufficiently strong to overcome any opposition which might be offered to his progress to Han-kow, the point fixed upon as the ultimate destination of the expedition.

In accordance with this view the squadron, which left its anchorage a little above the mouth of the Shanghai river on the morning of the 9th of November, was composed of H.M.S. *Retribution*, Captain Barker; *Furious*, Captain Osborn; *Cruizer*, Commander Bythesea; gunboat *Dove*, Commander Ward; and gunboat *Lee*, Lieutenant Jones.

In consequence of the great draught of water of the *Retribution*, it was afterwards found necessary to leave her at a town in possession of the Imperialist forces, about 90 miles above Nankin.

All the remaining ships reached Han-kow, and the important services rendered by Commander Ward and Lieutenant Jones in sounding the channel in advance, and pioneering the larger ships into deep water, are deserving of the highest praise, while the great utility of the class of vessels they commanded for this description of service was strikingly illustrated.

The facility with which the *Cruizer*, a ship of 750 tons, and drawing 14 feet of water, under the able handling of her commander, made the passage to Han-kow, was the more remarkable, as she was furnished only with an auxiliary screw of 60-horse power. The importance of this fact will be better appreciated when we come to consider the commercial capabilities of the river.

We had not proceeded far on our river-journey before it became apparent that, notwithstanding the knowledge we had acquired of the navigation of the Yang-tze-kiang as far as Nankin during the last war, and the fact that, even so recently as 1854, Her Majesty's ships had visited that city, the channel of the river had undergone such a total change as to render the charts, upon which, doubtless, Captains Kellett and Collinson had expended so much labour and industry, calculated rather to mislead than to guide.

Twenty-four hours had scarcely elapsed before every ship in the squadron had discovered a new sandbank, by a process convincing, if not convenient; that of feeling it with her keel. Shoals had been converted into islands, or had disappeared altogether, and the spot formerly avoided as a danger, was now discovered to be the deep and safe channel.

But this entire transformation was not confined to the bed of the river alone. In some places its banks were similarly affected; former landmarks had disappeared, or become so altered as to be no longer distinguishable.

# MAP OF THE YANG-TSE-KIANG or TA-KIANG

FROM  
HAN-KOW IN HOOPEH TO NANKIN IN KIANGSU

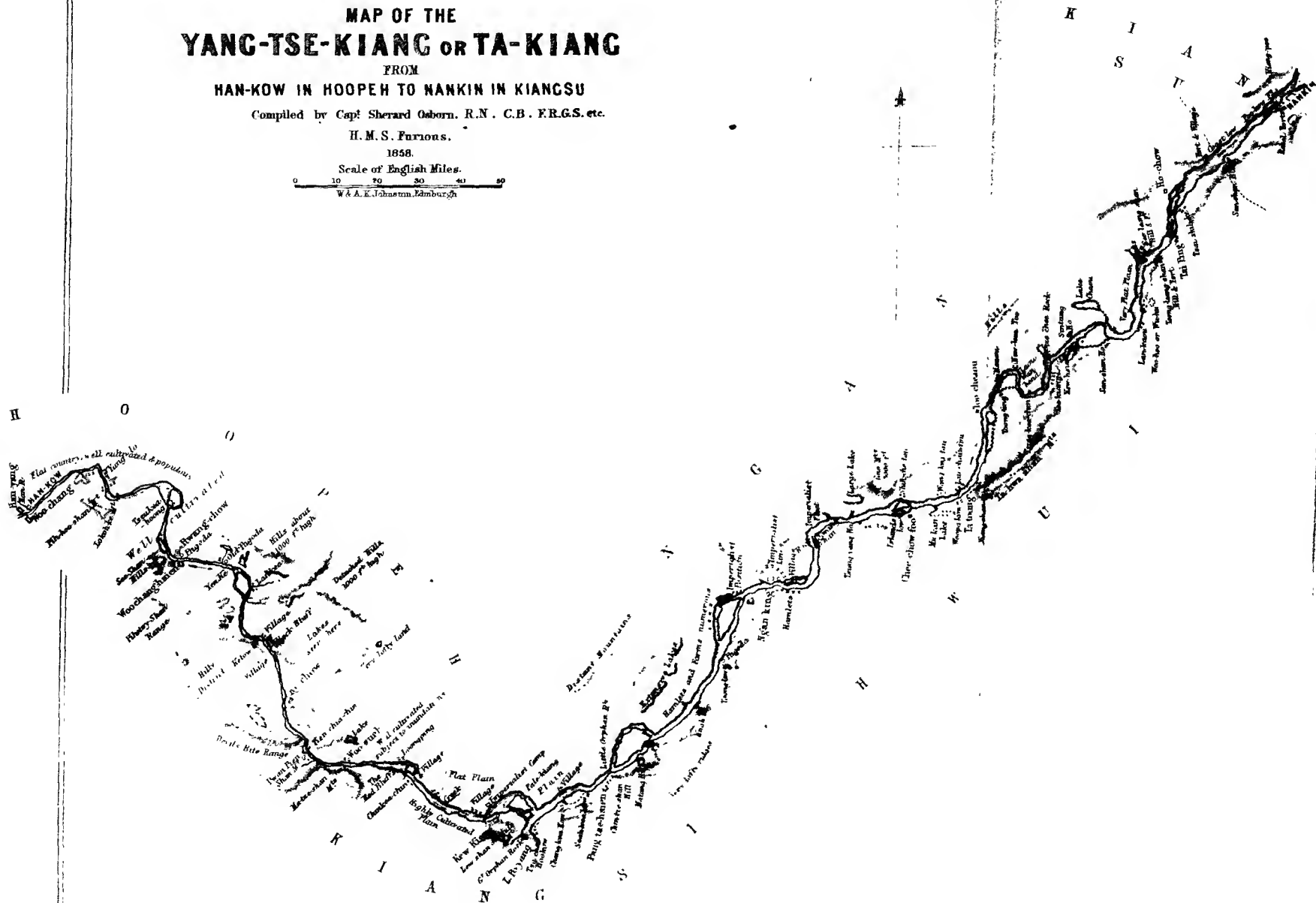
Compiled by Capt. Sherard Osborn, R.N. C.B. F.R.G.S. etc.

H. M. S. Furios.

1858.

Scale of English Miles.

0 10 20 30 40 50  
W & A. K. Johnston, Edinburgh





Thus Mason Island did not now appear to be separated from Tsung-ming by a channel three fathoms deep, but was connected with Harvey Point by a neck of land covered with bushes, and formed part and parcel of this vast accumulation of river-deposit which now extends from Drinkwater Point, below the entrance to the Shanghai River, to within three miles of the north bank of the Yang-tze-kiang.

The intricacies of this navigation delayed us for a day; on the 11th we proceeded more rapidly, passing the Lang-shan or Wolf's-hill Pagoda, a conspicuous object on the left bank perched upon a conical hill, which rises abruptly from the plain; opposite lay the village and fort of Foo-shan, "the Hill of Peace," prettily situated on low hills.

The river at this point is about 6 miles in breadth. Here our onward progress again received a sudden check. The channel which has been hitherto invariably followed by ships proceeding to Nankin, at this point crosses from the southern to the northern bank of the river. By this passage the *Belle-isle* and *Cornwallis* two-deckers reached Nankin in 1843; by the same passage, eleven years later, the *Syx* and *Rattler* found their way without difficulty within a few yards of the spot at which we found ourselves suddenly compelled to come to an anchor: 6 fathoms were marked on the chart of Captains Kellett and Collinson; on that spot our soundings gave us just 6 feet. For two days and a half the gun-boats were employed in looking for a channel. That one existed we entertained no doubt; it was impossible to suppose that the vast volume of water which is discharged by the Yang-tze-kiang should find its only egress to the sea over a 1-fathom bar; but it soon became equally certain that a-head of us no such channel could be found. It only remained to try back and discover whether the extensive spit of sand marked in the chart as connected with the northern bank, had been separated from it by some recent action of the river-current, thus leaving a passage between it and the main. Such, in fact, we found to be the case. Retracing our steps to Plover Point, a distance of 6 miles, we rounded the end of the spit, and proceeded along a deep channel, carrying 10 fathoms of water, where formerly there had not been 2. The important changes which have thus been found to have taken place in the direction of the current of the river, render an extended survey of its mouth a work not only of great necessity in a hydrographical point of view, but in the present state of our altered relations with China, of the utmost importance in the interests of our commerce with that country. When we consider the northerly direction taken by the current at Lang-shan, and the violence with which it seems to impinge upon the land formerly known as Mason Island, silting

up a channel 4 miles broad, it may very fairly be conjectured that a larger proportion of the volume of water which splits itself upon the western point of this land finds its outlet by the northern channel than formerly, and that those sand-banks which at the period of the last survey seemed to block this entrance may be found to have been swept away, and replaced by a deep, wide passage. The increased multiplication of obstacles which now exist to impede the navigation of the southern branch of the river are strongly in favour of this hypothesis.

From this point to Chin-kiang the banks of the river are too well known to require description; nothing occurred to mark our progress until the morning of the 16th, when, on rounding the bluff opposite Silver Island, and whilst admiring the scenic beauties of that magnificent reach, which extends from it past the city of Chin-kiang to Golden Island, the *Furious* suddenly struck upon a sunken rock in the centre of the narrow passage, through which the whole British fleet, consisting of 80 sail, had passed unscathed in 1843, and at a spot where 16 fathoms were marked upon the chart.

During the three following days the most unremitting exertions were used in lightening the ship, but it was not until guns, shot, and coal, weighing upwards of 260 tons, were taken out of her, that she was sufficiently buoyant to float off into deep water. This interval was taken advantage of by those not otherwise employed, to explore the neighbouring country and visit the city, or rather the ruins of the city, of Chin-kiang-foo.

The suburb through which our path led us for nearly 2 miles did not exist even in ruins; the ground once covered by it was now an utter waste of brickbats, overgrown with weeds; here and there some former inhabitant had returned, and collecting the fragments of his demolished abode, raised a fragile tenement of broken bricks and tiles, and roofed it in with grass, the dreary hut rather adding to than diminishing the general aspect of desolation which surrounded it. In the city the shells of houses still remained, and the streets reminded one strongly of those of Pompeii, only at one point a small knot of inhabited houses formed the nucleus of a population once numbering some hundreds of thousands of souls.

Some ten months have elapsed since the city was retaken from the rebels by the Imperialist forces, but as many years will be required to restore it to its former condition. At present confidence has not been sufficiently restored to induce the inhabitants to return and rebuild their fallen houses.

At Kinshan or Golden Island, a picturesque rock a little above Chin-kiang, on which stand a ruined pagoda, and the remains of some temples, another remarkable change has taken place in the river. The rock is no longer an island. We walked to it through



cabbage-gardens; but fifteen years ago it was divided from the main land by a channel, in which, according to the chart, there were 10 fathoms of water.

From the summit of this rock an extensive view is obtained over the vast plain to the northward, through which we could follow the winding course of the Grand Canal, the ruined town of Kwa-chow marking the spot at which it enters the Yang-tze-kiang. Two or three war-junks were the only signs of river-life at a point once celebrated as a focus of commercial activity. Rising out of the hazy atmosphere of the plain we could discern the pagoda of Yang-chow, though the distance was too great for us to detect the rebel bands said to be threatening it at the time.

It is worthy of note, that it is only from this point to the sea that the River Yang-tze-kiang is known to the Chinese by that name: henceforward we heard it called only the Ta-kiang, or Great River; nor do sinalogues now receive as correct the poetical interpretation which has heretofore been received as the true signification of these three characters.

It seems a pity to dispel the delusion that Yang-tse means "Child of the Ocean," but the character Yang, which is the same as that used in Yang-chow, means "to spread;" and as this is the point at which the river begins to spread, and as it ceases to retain the appellation when it is no longer so distinguished, it is most probable that this is the correct meaning of the first character. Tze means "son," and Kiang "river." In the orthography which I have followed throughout in spelling the names of the places on the bank of the river, I have been guided by the simple rule of endeavouring to produce with the letters of the alphabet, as pronounced in the English language, the nearest approximation to the Chinese sounds, believing that though we should avail ourselves of all the vocabularies of Europe, and incorporate into one orthographical system all their forms of accentuation, and varieties of pronunciation, we should still fail to convey to the ear of the English reader any notion of those sounds which even foreign residents in China, with the exception of a few sinalogues, do not attempt to give utterance to. The only instance in which I have departed from this rule is in that of the hard "K." The most competent authorities assert that this letter in the words "Pekin," "Nankin," &c., is pronounced "Ch;" as, however, the introduction of the cities "Pechin" and "Nanchin" for the first time into the Chinese empire would serve rather to confuse than otherwise, the hard "K" has been retained throughout.

On the afternoon of the 20th we passed the advanced junks of the Imperial fleet, at present blockading Nankin, and which are moored just out of range of the rebel batteries. A few moments afterwards the flag of truce hoisted by the *Lee* was fired upon by

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the rebels, and a collision ensued which resulted in a loss to ourselves of one killed, and two severely wounded, and was terminated only by the increasing darkness.

After a short engagement of an hour and a half on the following morning, in which we succeeded in silencing and partially demolishing the rebel batteries, we proceeded on our voyage up the river.

The river at Nankin is about 1000 yards broad. On the northern bank the rebel battery of Poo-kow faces the southern works. On the southern bank their position extends for 8 miles above the town, terminating in a battery which an Imperial fleet was in the act of engaging as we passed.

The lines of the Imperialist army, said by the Chinese to be composed of "many myriads," were visible crowning the heights in rear of the city. Their position occupies a semicircle, of which 10 miles of the river forms the chord. A wall apparently encloses this vast area, recently built by the Imperialists for the double purpose of more effectually blockading the besieged, and fortifying their own position. Their extreme left rests on the river at a small town, name unknown, 2 miles beyond which the bluff of Sanshan, or the "three hills," projects boldly into the river. A little beyond Sanshan the river divides into two channels; the northern was that followed by Lord Amherst in 1815, and passes within 2 miles of the city of Ho-chow, the pagoda of which was dimly visible from our mast-heads.

The river reunites a little above Tai-ping, about 20 miles higher up, the intervening islands forming a flat expanse of reeds from 4 to 8 miles in breadth. In the far distance to the north we could discern an apparently lofty range of mountains behind Ho-chow. On the southern bank the bluffs frequently projected into the river, occasionally, however, receding into swelling hills at a distance of some miles, the intervening strip covered with reeds, and but very thinly inhabited. These hills, which attained no great elevation, appeared covered with a short, coarse grass, and sometimes with heather.

For the next 15 miles we were doubtful in whose hands the banks of the river were; not a junk was visible on its waters, and scarcely a soul appeared on its banks, except now and then a fisherman or ragged labourer. At last we reached the small town of Tsai-shih-ke, built in a recess of the hills, which here approached the river, and defended by two or three circular stone redoubts, mounting three or four guns each.

Some rebels in bright colours came down to the water and fired at us with gingsals, but we had not time to do more than destroy one fort and scatter its defenders. The same evening we anchored off the rebel city of Tai-ping, but its garrison were not in a warlike mood.

From this point to Kew-hsien, a distance of 44 miles, the southern bank is in the hands of the rebels, who overrun the country for some distance inland, and live upon the contributions they forcibly levy from the impoverished peasantry. Whenever there is a strong position on the river they occupy both banks, but on the northern shore confine themselves to garrisoning isolated posts, and cannot be said to hold the country.

Thus, at the romantic pass of the eastern and western Pillar Hills, through which the river forces itself about 6 miles above Tai-ping, they occupy the fortified rocks on both sides. These fortresses are in the highest degree picturesque. The "Toong-Leang-Shan," or Eastern Pillar hill, is a precipitous bluff, rising to a height of from three to four hundred feet out of the water, crowned with a crenellated wall; its rugged face frowns with batteries, and is scored with rock-cut steps and steep zigzag approaches. Its *vis-à-vis*, the See-Leang-Shan, or Western Pillar hill, is shaped like the Rock of Gibraltar on a smaller scale. It, too, is covered with fortifications, a cluster of houses nestle at its base, a Bhuddist temple is perched on its dizzy cliffs, and the guns of a line of earthworks running along the water's edge sweep the narrow passage, which, not above three quarters of a mile broad and commanded effectually by the batteries on the rocks, would render this an impregnable position in the hands of a civilized power. In a strategical point of view, it may be regarded as the key of the river. Immediately above this pass, the river is again divided by large flat islands, which extend for about 36 miles. As neither the soundings nor direction of the northern channel were promising, we again followed the southern branch. The low land on our right was fortified for a distance of three or four miles by five forts, admirably constructed of unburnt brick and stone, flanked by bastions mounting heavy guns, apparently well garrisoned by the rebels, and altogether presenting a most finished and at the same time effective appearance. These forts were placed on a level with the water, and distant from each other about three quarters of a mile.

The opposite bank retained its character, the grassy hills occasionally running down to the river, and there terminating abruptly. The important rebel position and once flourishing town of Woo-hoo is situated on the southern shore. It is distant about 22 miles from Tai-ping, and its site is marked by two pagodas, one situated on the river bank, the other on a hill a short distance from it. We had met with no opposition from the numerous batteries we had passed during the day, and were courteously received by the rebels in occupation of the line of forts which form the military post on the river. The town itself is about two miles inland, on a small tributary, which here enters the Ta-kiang. The intervening

distance was lately covered by a populous suburb,—it now looks a very likely place for pheasants. Some of our party visited the town, but found only a solitary street standing, and that contained scarcely any shops.

Before the rebel incursion, Woo-hoo was considered one of the most important commercial towns on the river. Neither did the rebel chief, whom I visited in his Yamun, nor the rabble by which he was surrounded, prepossess one in a way calculated to remove the unfavourable impression which these evidences of deeds of blood and violence could not fail to produce in the minds of those who witnessed them. They stated the rebel force in occupation of this post to be 8000 strong. Only about three miles above the town, at the village of Lan-kaou, we passed a large blockading squadron of Imperial junks. These are of course cut off from communication with Nankin, but are enabled to traverse the river with comparative safety above this point to Ganking; junk fleets being stationed at various points in the intervening distance.

Beyond Lan-kaou the southern bank of the river begins to change its character; the grassy hills are replaced by wooded mountains, possessing great picturesque beauty, and enclosing rich and formerly well cultivated valleys. We could see the process of depopulation going on as we passed them. Whole villages were migrating for safety, though, alas! without much hope of finding it; the rebel army devastating the country as it advanced, and finally we saw them engaging the Imperialists at Shen-Shan-Kya. From the nature of the fighting, however, the battle did not seem likely to be attended with very serious consequences to either side.

"Kew-hsien" was the first Imperialist town we had reached since entering the rebel country at "Nankin." It was partially protected from attack by the range of mountains, which, rising abruptly behind the town, and extending for some miles along the river bank, secures to the narrow strip of intervening district with the villages upon it some immunity from the predatory incursions of the insurgent forces. Immediately in rear of this range the country is overrun by them. The town of "Wan-chang" is distant only 14 miles from Kew-hsien, forming one of their important military posts, from which they threaten the Imperialist position on the river. Leaving the *Retribution* at "Kew-hsien," we proceeded on our voyage with the remaining four ships, the hills on our left rising in confused masses to a height of about 2000 feet above a richly wooded and diversified strip of lower land. Passing the picturesque rock of "Pan-tze-ke," with its ruined temple and pagoda, embosomed in autumn-tinted foliage, we reached the Italian looking town of Tee-kiang, also Imperialist; its white houses clustering up the hill side, and its handsome stone bridge of three arches spanning a small tributary stream. At this point

the range winds abruptly away from the river in a southerly direction. A vast level plain extends on both sides, the distant range still visibly bounding the northern horizon, and towering above the intervening ranges, the lofty peaks of the "Ta-hwa-shan" may now for the first time be observed to the south-east.

The river now takes a somewhat eccentric course, widening into noble reaches, most magnificent and imposing and of great depth, then folding back like a huge serpent, and embracing in its coils large flat islands on the southern bank. Toong-ling is said to be in rebel occupation: following the northern branch this city is not discernible, but on the opposite shore we pass the rebel walled city of Too-cheaou.

The northern range now begins to approach the river, its elevation apparently from 2000 to 3000 feet. The islands are generally covered with tall reeds, sometimes partially cultivated: the banks are dotted with hamlets, in rear of which the cultivated plain extends to the base of the mountains, but the country is by no means densely populated.

The navigation of the river is attended with no great difficulty up to this point; the soundings are regular, and the river occasionally unites into one magnificent sheet of water from 3 to 4 miles in breadth; usually, however, it is cut up by islands.

A spur of the "Ta-hwa-shan" range, of which the celebrated "Kew-hwa-shan," now distinctly visible, is the highest summit, approaches the river below Toong-ling, and terminates in the picturesque bluff called "Nang-shan-ke;" out of its precipitous face steps are hewn for the convenience of persons tracking boats.

Immediately above it the river divides into three branches. The large low wooded island which separates the two principal channels is called Ho-yeh-chow from a plant like arrowroot which it produces. From this point to Chee-chow-foo the southern bank is held by the Imperialists, the mountains again approaching the river and proving their best defence. This important provincial city, however, is in the hands of the rebels. It is situated on the southern branch of the river, but its pagoda was distinctly visible across the low island which divided us from it. Near the Imperialist town of Ta-toong the Moo-kan lake, or rather Lagoon, commences; and, it was reported, extended for a distance of 30 miles, separated from the river, to which it is parallel, by a very narrow slip of land, and running back to the mountain range.

We had no opportunity of landing and exploring this section of the banks of the river. According to Mr. Ellis the greater part of the hills in this neighbourhood are composed of sandstone and puddingstone, in a state of disintegration. We were delighted with the contrasts of the variegated foliage with which they were clothed; the dark green of the Scotch fir, the deep red of the

fading leaves of the tallow tree, and fiery tints of what appeared to be diverse species of oak and maple, covered the hills, as it were, with a carpet of the most brilliant hues.

The principal articles of cultivation here were the same as we observed throughout the whole length of our voyage up the river, and consisted chiefly of wheat, cotton, millet, sweet potatoes, rice, hemp, and beans.

At Tsung-yang, an Imperialist post situated on a small tributary which takes its rise in the range on the north bank, here known as the Gno mountains, we passed an Imperial fleet consisting of 350 junks. These were co-operating with the land force then engaged in besieging the capital city of Ganking. At this spot a remarkable rock called the Tai-tze-ke rises out of the mid stream, and is covered by the ruins of a temple. A few yards below it a rocky ledge runs from the southern bank, more than half way across the stream, the sharp points rising out of the water like stepping stones, and forming a most dangerous reef. The passage for ships in which there is plenty of water passes close under the left bank, and is called the 48 chang, or 180 yards passage. The legendary name of the reef is Lan-keang-ke, or the Hen barrier. Before reaching Ganking, the channel again divides, passing through a broad expanse of cultivated and grazing land, upon which we observed numerous herds of cattle. The mountains on the left bank approach close to the city, the lower heights crowned with the standards of the Imperialist troops.

Considering its importance as the capital city of the province of Ngan-hwui, we were disappointed in the extent and general appearance of the city. It boasts, however, the handsomest pagoda on the river, and the walls are massive and in good preservation. Looking over them from the mast-head we observed large spaces covered with ruins. We no sooner came within range of their guns than the rebel garrison opened fire upon us; a sharp cannonade in reply silenced them in less than a quarter of an hour, and though the channel led us close under the guns on the city wall, we passed without a casualty. Henceforward our way lay through peaceful districts, this being the last rebel post up the river. We made speedy progress to Toong-lew; some of the reaches were about 10 miles in length, with a uniform breadth of about 2 miles. From the mast-head large lakes were visible on both sides, sometimes embosomed among the hills like Highland lochs, at others assuming a more marshy appearance, and covering for miles the plains at their base. In the summer months all these lakes are filled by the overflowing waters of the Ta-kiang, which is subject to vast annual inundations. The height of the occasional rise of the river was singularly indicated upon the face of the precipitous cliffs that terminate the high mountain range,

which approach the river on the right bank below Toong-lew. These mountains are separated from the river by a narrow plain, but with the telescope the high water mark was distinctly visible on the sheer bluffs. At Ma-toong-shan the river divides, the southern branch running in under the mountains, which here overhang it in a very remarkable and striking manner.

We landed on the opposite shore, and crossing a partially cultivated plain for about two miles reached a chain of lakes which apparently extend without interruption from Ganking into the province of Kiang-si. We punted about them in chase of the numerous flocks of wild swans, geese, ducks, and other water-fowl with which they abounded, and found them to be of no great depth. They were from two to three miles wide, and as seen from the mast-head, looked like some rival river to the Ta-kiang. From their opposite shore undulating hills rose one above the other, and formed at last a lofty range. Although we were favoured with a cloudless sky on our voyage, the atmosphere was unfortunately so hazy, that we but rarely got glimpses of some very distant mountains which now and then loomed away to the northward. Their towering peaks were apparently forty or fifty miles off, and of great elevation. At the singular rock called Seaou-koo-shan, or the Little Orphan hill, the river rushes with great velocity through a narrow channel, scarcely a quarter of a mile in breadth. Our soundings gave us fifteen and sixteen fathoms. Rising like a wall out of this deep water on the southern side, the bluffs known as the Chintze-shan, or Mirror hill, attain an elevation of 500 feet; its rocky ledges crowned with the walls of an abandoned rebel fortification. Facing it, the Little Orphan, like a gigantic land-mark, shoots in an isolated mass out of the stream to a height of about 300 feet. A temple hewn out of the face of the rock is approached by an almost precipitous flight of steps, and invests this remarkable rock with a double interest. Altogether there is only one other spot on the river which can compete with the grandeur and sublime beauty of this pass.

It has been chosen, not unnaturally, as the boundary of the two provinces of Ngan-hwui and Kiang-si. We were now in the latter; on the southern shore the mountains came down to the water's edge; on the northern, they again receded and were separated from us by plains and lakes. A gale of wind and the intricacies of the navigation baffled and delayed us as we approached the entrance to the Poyang Lake. We had been three weeks in performing the voyage to this point. We were delighted with the noble scenery which distinguishes this important feature in the geographical configuration of this part of China.

The magnificent Leu-shan, or Mule Mountains, abruptly terminate in a stupendous peak, upwards of 5000 feet in height, which seems to preside over this great meeting of waters. The

eddies circle round the rugged base of the Tsa-ke, or "Jagged Head," on the summit of which the white houses and walls of Hoo-kow are picturesquely perched; while the Ta-koo-shan, or Great Orphan rock, stands like a sentry at his post in midstream. But the interest of this spot is not confined to the attractions of its scenery alone. There is no section of the river more worthy of attention in a geographical point of view. We had now ascended the Ta-kiang for a distance of 450 miles, and had only just reached its first real affluent. For, with the exception of the Tsung-yang river, which joins a lake a little above Ganking, all those tributaries, marked as such in the maps, turned out to be ditches, almost dry in the winter time: but here the great river meets a feeder worthy of it. In a single deep rolling tide the Poyang Lake discharges into it the whole drainage of the vast province of Kiang-si. Into this extensive basin fall the Kan, Foo, and Siu rivers, and the Sung-lo, Bohea, and Meilan hills pour their respective contributions. These hills form a half circle, and separate Kiang-si from the adjoining provinces of Cheh-kiang, Fokien, and Kwang-tung. The rivers which rise on their outer slopes water all those rich seaboard provinces, while those which rise on their inner are all collected in the Poyang Lake. These considerations will enable us to form some estimate of the volume of water which goes to swell the Ta-kiang at this point. Surrounded on all sides by lofty ranges, the northern barrier of the lake must, at some former period, have proved the feeblest, and given egress to the accumulated waters through this gorge, known as the Pa-li-kiang, or eight-li river. As though to meet this important accession, the Ta-kiang seems to have taken that great southern bend which forms one of the most marked features of its long course. In forming this curve, it has been compelled to force its passage through the Ma-tse-shan, or "Horse Spine" range, which forms a part of the western boundary of Kiang-si, dividing that province from Hoopoh. These mountains cross the river at Woo-sueh, and under another name trend away to the north-east, marking the frontier of the province in that direction, and leaving a small strip of it enclosed between them and the northern bank of the Ta-kiang. After having thus fulfilled its mission by dipping into Kiang-si, and carrying off the surplus waters of the Poyang, the great river leaves the province by the romantic pass of the Seaou-koo-shan, or Orphan hill already described. The mountain system of this part of China may be better understood by supposing that with those ranges, along the base of which the river forms its southern curve, a northern range is connected, forming as it were a loop upon it, and opposing barriers which the river has burst to obtain ingress and egress. At the same time it is to be borne in mind that the mountains composing this loop are not the only



mountains to the north of the river. As repeatedly observed, high ranges were constantly visible in that direction, though they rarely approached the river. In fact, throughout the whole length of our voyage, the great valley of the Ta-kiang maintained the same general character which may be described in a few words. Its breadth varied exceedingly, and may have ranged from 10 to 50 miles. The river invariably hugged the southern ranges, which seldom receded more than 4 or 5 miles from its banks, leaving a strip of alluvial plain, while numerous lakes washed their base or lay embosomed among the hills. To the north, plain and lake sometimes extended as far as the eye could reach, but, generally mountains more or less distant closed the prospect.

It would seem impossible for us with our limited experience to form any idea of the aspect which this valley must present during the summer rains. The country people accounted for the temporary appearance of their dwellings by the fact, that they were removed before the floods, asserting that the river occasionally rose 100 feet. We were contented to believe, however, our own observation, and the marks we perceived convinced us that 50 feet above its then level was a low estimate for the summer rise. But even this would lay thousands of square miles under water. Nor are these inundations always fertilizing in their influence. We observed, in places where the current had evidently rushed violently over the face of the country, extensive sand deposits overlying the rich loam which composed the subsoil. In some parts, and this was more especially noticeable near Hoo-kow, the strong gales which are common in this locality had swept the sand into dunes, which present a remarkable contrast to the green knolls and wooded mountains which usually rise from the river-bank. Immense areas of cultivated or pasture land are thus occasionally devastated, and even ultimately the waters only partially recede, leaving vast tracts of country covered with those lagoons and marshes already described. It can hardly be doubted that these lakes exercise a very marked influence upon the rise and fall of the river. During the dry season a considerable subsidence takes place, and the channels by which their surplus waters were discharged into the river dry up. The consequence is, that after partial rains all those mountain torrents which would under other circumstances go to swell the waters of the parent stream, get absorbed in the lakes at the base of the hills, and unless the rain is of sufficient duration to overflow them, the river receives no additional supply. Meantime the great evaporation which must take place from so large a surface of water renders the rise of the lakes comparatively slow. This would appear the only way of accounting for the fact that although partial rises do occur in the river, they are not so common as the humidity of the climate would lead one to anticipate. In all probability, however, it will be found that below the Poyang Lake these rises

occur with greater frequency than above it. This may be presumed from the fact, that the waters which supply the Poyang rising in lower latitudes are not subject to those frosts, and are more readily thawed than the upper tributaries of the river, and that consequently the volume of water discharged from that lake varies in amount to a much greater extent than that which flows down to meet it.

At the point of junction large flat islands of sand have been formed, and constantly shifting banks render the navigation difficult and tedious. On our downward voyage, in consequence of a fall in the water of seven feet, which had taken place during the interval of a fortnight, the *Furious* and *Cruizer* were detained for fifteen days just above these bars, and had given up all hope of escaping from their imprisonment until the spring rains, when an unexpected rise of three feet took place, and floated them over.

About 15 miles above the confluence is the provincial city of Kew-kcang; its walls, running for miles over the tops of barren hills, enclosed, as usual, a vast area covered with ruins. It is surrounded by lakes, in rear of which rise the Lew-shan mountains. The general bearing of our course now became north-west, and we entered upon the finest scenery of which our experience of the river can boast. Both banks are well cultivated and populated until we reach the Ma-tze-shan mountains, which, rising abruptly from the water's edge to a height of from 1500 to 2000 feet, display a charming combination of wild moorland and rocky promontories, with wooded valleys and verdant slopes. A little beyond Woo-süeh, a populous town on the opposite bank, this range turns off to the south-west; behind it we could see three distinct ranges rising one above the other in the far distance. The gigantic rock called Pwan-pien-shan, rearing its rugged crest to a height of about 300 feet above the water in one sheer wall, marks our entrance to the province of Hoopeh. Facing it, a precipitous limestone range, scarped by quarries, overhangs the river, which here forces itself through the narrow gorge I have already alluded to, as the entrance to the loop of mountains. Were it not for the current, we might at this point imagine ourselves in a Highland loch. The river seems to have no outlet from the mountains which surround it. In front, the fantastic summits of a range about 3000 feet high, to which, in consequence of a singular depression in their outline, we gave the name of the Devil's Bite range, close the prospect. Behind us were the Ma-tze-shan, while on either hand limestone cliffs and overhanging bluffs enclosed us within their rocky limits. Emerging from this interesting pass, we opened on the left bank the picturesque city of Kc-chow, also in ruins; opposite to which a large lake studded with islands was observed at a little distance inland on the right bank. In mid-stream a round fort like a martello tower rises out of the water.

Beyond this the mountains recede on both sides, and the extensive plains are well peopled and cultivated until we reach the Ke-tow bluff, when beetling limestone cliffs and rugged promontories again overhang the river on its southern shore. These are connected with the Pih-tze-shan range to the westward.

Throughout the whole length of our voyage to Han-kow, not only did the banks of the river retain very much the same character, but the cultivation did not perceptibly alter. The cotton of the district of Hing-kwoh, which is the first on entering Hoopeh, is celebrated. To the north and east the Lotien range, which we fancied we perceived in the distance, produces some good teas. At Hwang-chow, a large walled provincial city with a handsome pagoda, the vast level plains stretched away on either side, affording pasturage to herds of buffaloes. The people seemed more prosperous and the country better populated than in those districts which are still liable to rebel incursion. Not that even here that danger is very far removed. Some large lakes were visible on the right bank opposite Hwang-chow; but our information was precarious and insufficient, and I could not be satisfied which was the Liang-tze, celebrated as one of the largest lakes in this province of lakes. At all events, they were connected with it, and formed part of a chain which affords water communication direct with the largest lake in China—the Toong-ting, and, we were told, would enable boats to avoid the détour to the northward which the river makes past Han-kow. From this point to Han-kow the highlands become more rare, and plains and lakes more numerous.

Although there was every appearance of a denser population than had characterised many sections of the lower portion of the river, we were not impressed with the idea either of the fertility of the soil, or the wealth and abundance of the inhabitants, which the meagre accounts that had previously reached us, led us to form. The peasantry, where the country is not harassed by civil war, are contented and comfortable; but there is a total absence of anything like a display of wealth or luxury either in the towns or country. It is difficult to judge of the trading capabilities of a country so internally convulsed as China is at this juncture, but there seems a great danger of over-estimating them. Even between the Poyang lake and Han-kow, where the river is perfectly free from rebels, hardly any trading junks are to be seen; and until we reach the latter city there is no spot at which any considerable head of population is collected, or any indication of an extensive internal traffic apparent.

There can be little doubt, however, that the natural advantages which that celebrated mart possesses, must always render it a place of great importance in a commercial point of view; and it is not easy to estimate the effect which the concentration of a foreign

community, and the accumulation of foreign capital at this point, may produce upon the river traffic generally, or to what extent it may tend to stimulate mercantile enterprise and activity at different localities upon its banks; still less can we speculate where those localities are likely to be. The causes which combine to create a local traffic are so various, and trade is sometimes found to develop itself so capriciously, that we must leave these events to decide themselves. It would seem, however, that the entrance to the Poyang lake would prove an important centre of commerce. There can be no doubt that few rivers in the world offer greater facilities for navigation than the Ta-kiang; and, although a ship drawing 16 feet of water at a distance of 500 miles from the mouth in the dry season experienced some impediments to her progress, vessels of a smaller draught could always navigate it with ease. The *Cruizer* never once touched the bottom after getting clear of the shoals at the mouth. Inasmuch, however, as grave objections exist to the employment of auxiliary screws in merchantmen upon long voyages, it will probably be found that the whole trade on the river will be carried on by steamers adapted to the purpose, and that Shanghae will be the port of transhipment. The question will then resolve itself into one of competition between Chinese and foreign inland transport; and experience will soon prove how far the cheap but slow junk will hold its own against the expeditious and expensive steamer. The distance from the Poyang lake to Han-kow is estimated at about 180 miles. As we approached our destination, the vast plains on both hands seemed more thickly populated than any tract of country we had passed hitherto. Hamlets and villages now lined both banks continuously. The dull uniformity of the plain was here and there broken by ridges of low hills, of which the most remarkable terminated in a bluff over the river, known as the Pih-hoo-shan or White Tiger mountain. Numerous lakes were visible in every direction. Hills on both sides of the river mark the site of the three cities of Woo-chang, Han-yang, and Han-kow,—the former situated on the right bank, the two latter on the left.

The Han river here joins the Ta-kiang. It rises in the Tsanling mountains, in the province of Shen-si; and, after a course of about 600 miles, falls into the great river at Han-kow. There is a considerable traffic carried on upon its waters, which were crowded with junks at the point of confluence. Its breadth, however, opposite Han-kow does not average more than a hundred yards. The mart of commerce is situated on its left bank, and occupies the triangle of which the two rivers form two sides. The area which it covers is not very large, and its closely-packed houses and crowded streets do not contain, to all appearance, more than half a million of souls. On the other side of the Han, a spur of hills, crowned with a loopholed wall, conceals the once

complete little city of Han-yang: it is now a desolation and a waste, comprising only a few hundred inhabited houses; the ruined archways which span its deserted streets, and the carved blocks of granite strewn about them, alone testifying to its former pretensions. The capital city of Woo-chang, however, situated immediately opposite Han-yang, presents a noble appearance. The river at this point is about a mile in width; its right bank is faced by the double line of walls which for about two miles forms the fortification of the city. Within, the swelling hills are terraced with houses, and adorned with temples and pagodas; while beyond them, in the distance, the city walls may still be discerned enclosing an enormous area. When entered, unfortunately the discovery is made that it borrows much of its enchantment from distance. From Han-yang the walls look white and glistening, and the houses roofed and perfect; but when inspected more closely we find the same scene of ruin and desolation, though not to so great an extent as in other cities, which have undergone the same experiences of rebel occupation, and can tell the same history of sieges and defences. Woo-chang is the residence of the Governor-General of the two Hoos; his yamun is in good preservation, and approached by a handsome street, which tunnels through a hill. The population, together with that of Han-yang, may equal that of Han-kow. Its once inhabited area was fully as great as that of Canton, while the walls were estimated at about a third longer. Both here and at Han-kow the streets were broader and cleaner, and the shops handsomer, than is usual in Chinese cities. Two years have scarcely elapsed since the latter place was burnt to the ground, but it is rapidly undergoing the process of restoration, and the collection of foreigners here will give it an impetus, and will do more to advance it than any Imperialist success over the rebels, whom the people still hold in dread.

It would swell the limits of this paper too much to enter upon the principal features which characterise the trade at present existing at Han-kow. There can be no doubt that it is the only place on the lower part of the river which has any pretension to commercial activity; nor is there any spot in the empire more suited to be the centre from which foreign trade will radiate.

How long and under what conditions it will be, looking at the present convulsed state of this section of China, before a foreign community will be established here, are questions of a political nature, which it does not fall within the limits of this paper to discuss. How, when any such settlement is made, advantage can best be taken of the increased facilities which will then be offered to the introduction of British manufactures into the heart of this vast empire, is a commercial consideration which will doubtless engage the attention of those interested in the subject and competent to deal with it. Meantime we may safely predict that,

sooner or later, the mighty Ta-kiang will afford abundant occupation for the statesman, the merchant, and the geographer.

In conclusion, I would beg to call the attention of the Society to the obligation which we are under to Captain Sherard Osborn, Mr. Court, and Mr. Bridges, of the *Furious*, for the very elaborate and interesting chart of the river, which Captain Osborn has kindly permitted me to enclose, and which will doubtless do more to convey a correct idea of the course of the stream and the nature of its banks than the paper it serves to illustrate. He has also furnished me with the appended abstract of distance between all the important points on the river from Woosung to Han-kow.

*H.M.S. "Furious."*

ABSTRACT of DISTANCES accomplished Daily between Woo-sung and Han-kow, on the Yang-tze-kiang.

Date.	Place.		Distance	
	Left.	Arrived at.	Run.	From Woosung.
1858.				
Nov. 8.. ..	Woosung .. ..	Bush Island .. ..	8	8
9.. ..	Bush Island .. ..	Aground on Blonde Shoal.	16	11
10.. ..	Blonde Shoal .. ..	Harvey Point.. ..	4	23
11.. ..	Harvey Point .. ..	Off Foo-shan .. ..	25	48
12.. ..	Off Foo-shan.			
13.. ..	Ditto.			
14.. ..	Foo-shan. Went back 13 miles, as far as Plover Point, from thence 37 miles up the river	Kiang-yin .. ..	50	72
15.. ..	Kiang-yin .. ..	Fishbourne Shoals ..	37	109
16.. ..	Fishbourne Shoals ..	Silver Island .. ..	23	132
17, 18, 19	On shore at Silver Island.			
20.. ..	Silver Island .. ..	Nankin .. ..	48	180
21.. ..	Nankin .. ..	Tai-ping .. ..	35	215
22.. ..	Tai-ping .. ..	" .. ..	5	220
23.. ..	" .. ..	Woo-hoo .. ..	17½	237½
24.. ..	Woo-hoo .. ..	Too-che-aou .. ..	48½	285½
25.. ..	Too-che-aou .. ..	Tsung-yang (Rocky Shoal)	48	333½
26.. ..	"Tsung-yang," passed Nganking	Toong-lew .. ..	49	382½
27.. ..	Toong-lew .. ..	On shore .. ..	10	392½
28.. ..	Passed Sea-ou-kou-shan (Little Orphan Rock)	Nearly to the Poyang Lake	38	430½
29.. ..	Arrived at the Poyang Lake			
30.. ..	Poyang Lake .. ..	Kew-kiang .. ..	14	441
Dec. 1.. ..	Kew-kiang .. ..	Woot-seih .. ..	32	487
2.. ..	Woo-sueh (passed Kechow)	Hwang shih-kang ..	46½	533½
3.. ..	Passed Hwang-chow stoppage.			
4.. ..	Stopped.			
5.. ..	" .. ..	Yang-lo .. ..	36	603½
6.. ..	Yang-lo .. ..	Han-kow .. ..	20	623½

*H.M.S. "Furious."*

ABSTRACT of DISTANCES accomplished Daily between Han-kow and Woo-sung, on the Yang-tze-kiang.

Date.	Place.		Distance	
	Left.	Arrived at.	Run.	From Han-kow.
1858.				
Dec. 12 .. ..	Han-kow .. .. .	Northward of the Hwang-chow Shoals	53	53
13 .. ..	Hwang-chow Shoals ..	Woo-chang-hsien ..	11	64
14 .. ..	Crossing over to the Channel		5	69
15 .. ..	Red-sand Rock Point ..	Lime-quarries below Hwang-shih-kiang	19	88
16 .. ..	Lime-quarries below Hwang-shih-kiang	Woot-seih .. ..	48	136
17, 18 ..	Looking for Channel		..	136
19 .. ..	Attempted to cross the bar		1½	137½
20 .. ..	Crossed the bar .. ..	Kew-kiang .. ..	23	160½
21 to	Off Kew-kiang		..	160½
Jan. 2, 1859.				
1859.				
Jan. 3 .. ..	Kew-kiang .. .. .	8 miles above the "Poyang Lake"	12	172½
4 .. ..	8 miles above the "Poyang Lake"	5 miles below Sea-ou-kou-shan (Little Orphan Rock)	36	208½
5 .. ..	5 miles below Sea-ou-kou-shan	Lan-keang-kee ..	73	281½
6 .. ..	Lan-keang-kee .. ..	Kew-hien .. ..	84	365½
7 .. ..	Kew-hien .. .. .	8 miles above Nankin	78	443½
8 .. ..	8 miles above Nankin ..	5 miles below Kiang-yin	115	558½
9 .. ..	5 miles below Kiang-yin	Bush Island .. ..	60	618½
10 .. ..	Bush Island .. .. .	Wusung .. .. .	5	623½

VI.—*Ascent of the Yang-tze-Kiang.* By WILLIAM BLACKNEY, R.N.

Communicated by Captain BYRON DRURY, R.N., F.R.O.S.

Read, March 28, 1859.

H.M.S. *Actæon*, Shanghai, Jan. 10, 1859.

By the last mail (7th January) I sent you a postscript of the 'North China Herald,' with an account of Lord Elgin's Expedition up the Yang-tze-Kiang. I had not time to write a letter with it, but I trust you may find this which I write now readable—the paper, however, is the best general account.

You will no doubt be surprised to hear of the *Actæon* being still at Shanghai, as when I wrote in October we were on the eve of sailing for the North. The

Yang-tze cruise had only just then begun to be talked of, and luckily for us Lord Elgin decided on going a day or two before the time fixed for our leaving, and so the northern cruise was abandoned for one of much, more interest and importance. The *Actæon* was left at Wusung, *Hooper*, *Kerr*, *Ellis*, and *Farmer* remaining to survey the river to Shanghai, and Captain Ward and myself in the *Dove* detached for service in the Yang-tze.

*Dove* left Wusung on the 6th November, two days before the rest of the squadron, to examine the channel south of the Blonde Shoal, about 15 miles from the entrance. Our troubles commenced here; for the first day out we grounded and remained fixed for three or four hours. The chart we found worse than useless, for the channels are so much altered since the survey was made that it is impossible to pilot by it. Sunday the 7th the *Cruiser* made her appearance, and after we had piloted her beyond the Blonde, left her to pursue her way, thinking the chart was a sufficient guide. She grounded, however, about 2 miles s. by w. of Harvey Point, and when the *Dove* went to her assistance she grounded likewise, both vessels when the tide fell being high and dry. This position is where there were 9 fathoms when the chart was made—the bank stretching about a mile and a half N.W. and S.E. of us, all deep water according to the plan. After this we were prepared for anything, and merely used the chart for its geographical information: as for hydrography, we were obliged to find the channels as we went, and where the chart was right it was only chance, the bed of the river is so much altered. The tide during the night did not rise high enough to float us, and at low water we walked from ship to ship on the bank, and got equal altitudes, played quoits, &c., on it. Monday, 8th, in the forenoon both vessels floated, and *Dove* proceeded to join the rest of the squadron, which were then leaving Wusung. Lord Elgin and his suite in the *Furious*, *Retribution*, and *Lee* gun-boat. They were in such a hurry in the *Furious* that they could not stop a while to get the position of *Cruiser* bank. “More haste less speed,” for she grounded on the very bank *Cruiser* and *Dove* had discovered, and delayed us nearly two days getting her off. Thursday, 11th November, we proceeded, and at noon were brought up again off Fushan, 50 miles from Wusung. We had taken the channel along the south shore (right bank of river), and carried deep water till abreast of Fushan Hill; here it commenced to shoal, and the large ships anchored, while the *Dove* and *Lee* were employed searching for the channel. We crossed over to the left (north) bank under Langshan Hills and found a broad deep channel there; but how to connect it with the southern side was the difficulty. When the chart was made, the channel to cross in, though intricate, was deep; now, however, all our efforts were in vain—the greatest depth we could anywhere find being only 2 fathoms at low water; in 1854 we find the *Styx* crossed in 3 fathoms at low water. Friday, 12th, searching all day, but without success. Saturday, 13th, doing the same, and about 3 P.M. succeeded; *Dove* working along the southern channel in shoal water, and boats in the northern channel, each trying to approach the other in deep water: this happened off Plover Point, about 12 miles east of Fushan on the same side of the river. Sunday, 14th, the large ships had to retrace their steps to Plover Point, and led by the gun-boats proceeded up the northern channel in 6 to 10 fathoms, where according to the chart there is *shoal water with several dry patches!* This will give you an idea of the changes that have taken place, and here is by far the most intricate part of the navigation of the river: it took us six days advancing 50 miles. After passing Langshan the river narrows considerably, and though there are sand banks and shoals in it which are unmarked in the plan, yet by keeping mid channel we generally kept in deep water, and had no stoppage until arriving at Silver Island.

I am afraid you will find my letter very uninteresting thus far, so much about fathoms and shoals, &c.; but I think it would be incomplete if omitted,



and as you will probably remember the localities, it may interest you a little to compare the changes that have taken place since you were in the Yang-tze, in the memorable expedition to Nanking, 1841.

Tuesday, 16th November.—At Silver Island. *Furious*, with *Cruiser* in tow, leading; and *Retribution*, with *Dove* and *Lee* in tow (repairing their boilers), following. All under sail and going at utmost speed. No indication of danger either in the appearance of the place or on the chart, yet to the surprise of all the *Furious* struck suddenly on a rock, heeled over 10 degrees, and remained immoveable; fortunately there were no collisions among the others, for the moment it was observed the *Retribution* stopped and went astern *full speed*, with ourselves and the *Lee* close to her; how we managed to keep clear is a mystery; we both had our fires out, and entirely under control of the *Retribution*.

On sounding near the *Furious* we found she was on a bed of boulder rocks 2 to 2½ fathoms, stretching across the channel 200 yards from the w. extreme of the island; and from the opposite side sunken rocks extend, so as to narrow the deep water to less than 100 yards, yet strange to say the whole of Sir William Parker's fleet passed through, and no accident that we are aware of happened. The *Furious* remained on the rocks three days; she had to be lightened of all her coal, provisions, guns, and water; in the meanwhile the *Dove* was employed making a small plan of the locality and examining the channel on the north side of Silver Island. There was plenty of water in that, but the passage to the eastward, Silver Island, will no doubt be connected in a few years with the low bank of the river east of it, for since 1842 a grass flat of 300 yards length has grown up, and where the chart gives 10 and 12 fathoms, we could find barely 3½. The country around Silver Island is very pretty and diversified, but a wilder scene of desolation and ruin than the city of Chinkiang and the villages near it present, it would be impossible to conceive. All this has arisen from civil war: in flourishing times this part of the Yang-tze, where the Grand Canal flows into it, is said to be crowded with junks and boats freighted with the wealth of Northern and Central China; but at the present time scarce a boat of any description is to be seen, except the Imperial war junks blockading the approaches to Nanking. Chinkiang (where we had a smart conflict with the Tartar troops last war) is now in the hands of Imperialist soldiers, the inhabitants have nearly all fled, and there seems scarcely a sound house in it. The mandarins of this place were very civil indeed, offering to send supplies, &c., to any who were in want; but we were uncharitable enough to think they were civil only with the deeper design of mixing us up in their cause against the rebels: for when, after the *Furious* was all right again, we proceeded towards Nankin, they despatched their war steamer (a small screw vessel, 300 or 400 tons) to follow us, and as the whole squadron approached Nankin, this vessel kept close in the rear, looking very much as if she were one of us.

We left Chinkiang on the morning of the 20th of November, and about five in the evening came abreast of Nankin. The *Lee* had been sent ahead of the squadron to communicate with the rebels in case they made the first advances, and we thought she had passed all the forts unmolested, when three guns were fired from them. We are under the impression that these were not shotted guns. The *Lee*, however, says they were; at all events no shots were seen to fall in the river; the fourth gun was unmistakeably shotted, and the next, as if to relieve us of any lingering doubts, struck the *Dove* on her port-beam, just at the water line, and sent a shower of spray on board; in much less time than it takes me to write this, the answer was returned, *Dove* firing the first gun. The larger ships were more than half a mile astern at this time, out of range of the enemy's guns; the *Lee* had passed them; so that for about five minutes the *Dove* was receiving the whole of the fire; fortunately, however,

we were small, and moving rapidly, so the shot flew over our heads and astern, though quite close enough to be unpleasant; one struck us on the quarter, but did no damage. The moment *Retribution* could bring her broadside to bear, the forts on either bank got it very warm, though they still continued to fire briskly. The *Retribution* was struck about twenty times in her hull, and twice in both funnels; almost the first three shots she received killed a marine, carried off the arm of a young midshipman, and the leg of the signalman: these were the only casualties. *Furious* was struck several times; two shots lodged in Lord Elgin's cabin, and a third shattered his barge at the quarter davits. *Cruiser*, sternmost ship, had only one or two shots fired at her: the forts were silenced before she came up. We anchored in the evening about 2 miles above the city, and the next morning (Sunday, 21 November) dropped down quietly towards the forts and opened fire at daylight. There is no doubt that they had had quite enough of it already, for only five or six shots were fired by them: one of these struck the *Dove*, and passed between the arm and side of one of the men without doing any harm; rockets and shell were fired into the city, and the forts and guns crippled. The bombardment lasted an hour and a half, after which we pursued our way up the river. As soon as we left, the Imperial fleet was seen to get under weigh and commence firing on the rebels; but they kept at too great a distance to do any harm. The rebels, though sadly mauled by us, were even then a match for any Imperial force. The latter are much afraid of them, and almost invariably lose in the engagements; the rebels are by far the best soldiers. Nankin has been invested these last four years, and the only hope the Imperialists have of capturing it is by starving the rebels out. The celebrated porcelain tower is no longer in existence: it was destroyed by the Tartars rather than the rebels should make a fortress of it.

About 25 miles above Nanking we were again fired at from some stupid little forts on the beach; but the *Furious* and *Retribution* gave them such an answer that the fellows ran off as hard as their legs would carry them: the officer in command, who was on horseback, was so dreadfully frightened, and his horse too, that he dismounted, threw off all superfluous trappings, and joined the retreat on foot. Sunday evening our anchorage was near Tai-Ping, a large rebel city on the right bank, about 40 miles above Nankin. This looked strongly fortified. The chief came to Lord Elgin and told us that he had heard of the Nankin business, which was no doubt a mistake, and promised us messages should be sent to the various places in their hands along the river, and that we should not be fired at again.

10 miles above Tai-Ping we had a delay of 24 hours, caused by the *Retribution* grounding, and on the 23rd November anchored off the rebel city of Woohoo. The people of it were very civil, and there was some intention of leaving the *Retribution* here; but learning from an Imperial fleet a few miles beyond, that at Kieu-hien, 20 miles from Woohoo, fresh supplies could be had, it was decided the *Retribution* should be left there. The conversation that passed between the interpreter and the commodore of the Imperial fleet near Woohoo was somewhat amusing: he said he intended shortly to attack that city, and if the *Retribution* were left there it would be rather awkward if she were damaged in the engagement. While this conversation was being carried on in the cabin, we on deck were employed interrogating one of the commodore's crew, who unhesitatingly told us that this very fleet had been three years above Woohoo, and dared not run the gauntlet past it, or as he in Canton English expressed it, "have been three years top side, no can get down." So much for the old commodore's attack.

Wednesday, 24th November, the *Retribution* was left at the Imperial city of Kew-hsien, and the rest of the squadron proceeded. The next day while we were steaming full speed close to the left bank of the river, an animal was

observed swimming across to the off shore; the *Dove* chased it, and lowering a boat succeeded in capturing a wild boar: the prize weighed 150 lbs., and was soon disposed of. Anchored for the night off Chee-chow, and at noon of the 26th, Friday, came up to the city of Ganking, 150 miles from Nanking and about 330 miles from Wusung. *Furious* was headmost ship, and as soon as she came abreast of the Pagoda, the fort which encircles it opened fire. We were somewhat unprepared for this, after what the rebels had told us at Taiping and Woohoo. The signal to engage was soon made, and this pagoda and fort were so warmly replied to, that the inmates had to fly out to the rear for shelter. Our shot went through the pagoda and did very little damage beyond making a hole in it; but the shells sent parts of it into the air, and before the affair was over the front face of the fort was knocked down. When the rebels ran out the Imperialists attempted to take it; but rather than this should happen the former ran back again to suffer by our fire. The city stands on the left bank close to the water's edge, and the only channel is along the face of it, less than 100 yards from the walls. The squadron steamed slowly along it ready to fire only if fired upon first, and just as we were thinking of retreating from quarters and commenced to go on full speed, some foolish fellow, more daring than discreet, fired a paltry gingal at us. The exact spot it was fired from was noticed, and in about two or three minutes it was in ruins. This prolonged the engagement half an hour, and taking advantage of the confusion the Imperialist besiegers on the heights in the rear of the city commenced doing a little on their own account. They must have been disagreeably surprised, however, to get an occasional shot and shell from us. I noticed both *Cruiser* and *Lee* firing at them. Ganking is the last rebel city on the banks of the river, and is the worst situated of any of them: they are entirely cut off from any communication with others, and are believed to be suffering a great deal from hunger. The Imperialists are confident of taking it when the winter is in its rigour, and as neither give or take quarter, we may expect soon to hear of the horrible tragedy.

Leaving Ganking at 1 p.m., anchored for the night off the town of Soong-lew on the right bank, and the next day, Saturday, 27th November, the *Furious* grounded on a bed of rocks in the centre of the river: this delayed us twenty-four hours. Sunday, 28th, passed the Little Orphan, a remarkable rock on the left bank of the river, about 30 miles below the Poyang Lake. It rises precipitously 250 feet, has a pretty little pagoda on the top, and a handsome joss house or temple about half way up the face. Rising from the low flat bank it stands out a most remarkable object. Opposite to it on the right bank bold craggy cliffs 300 feet high fall close to the water's edge, the river flowing between them and the Little Orphan, being only 400 or 500 yards broad. As we passed through, the wind was blowing a fresh N.E. gale, with a thick mist, and the scene in consequence looking a very wild one. In the *Dove* we were rolling an occasional sea right over all, so that you will see the Yang-tze is not always calm, even at this distance from the sea, 400 miles.

Monday, 29th November.—Near the entrance to the Poyang Lake the channels were very intricate, and after a delay of twenty-four hours the *Furious* just managed to get over, stopped a few hours at the Imperial city of Kew-Kiang, and had an opportunity of seeing what it was like. A graver imposture it would be difficult to conceive. The walls, which look most formidable from without, and covered with banners, enclose an area of 2½ or 3 miles, yet there are certainly not more than 300 houses in it, and of these not one-fifth part are sound. The banners seem to have been planted there for years, and a few wretched looking tents are scattered along the parapet, but soldiers there were none. A rusty old gingal was the only gun seen. This, like all the other cities which the rebels have had possession of, is mostly in ruins, and the inhabitants living in a crowded and piggish state. 10 miles

above Kew-Kiang we had to cross a 3 fathom bar, and even this depth was found with difficulty. A few miles farther we came to the only really pretty spot on the banks of the river. The hills fall steep to the water on *both* banks, and the valleys between are highly and extensively cultivated. This lasts for about 10 miles, when the same monotonous features, low flat banks and occasional ranges of hills, extend all the way to Wuchang and Han-kow.

Friday, 3rd December.—Brought up by a bar, the greatest depth over it only 16 feet, a few inches more than the *Furious* drew. This was about 40 miles from Foochang, near the city of Hwang-Chow. The *Dove* preceded the squadron, with orders to return only if any more obstacles presented, in which case the *Furious* was to be left at Hwang-Chow. We were successful in carrying deep water all the way, and on Sunday, the 5th December, anchored at Han-kow, the long desired place of our destination, and the voyage to which from Wusung we had been thirty-five days accomplishing. Unfortunately it rained when we arrived, yet notwithstanding this, the crowd of wondering Chinamen who came to greet us was beyond all description. They pressed round us in boats, which were stowed so thickly that without any exaggeration we could have walked from the ship to the shore on them, a distance of 200 yards. No European vessel had ever before been seen there, and the puffing and hum of the gun-boat under weigh frightened them. We landed for a little while in the afternoon, and were not a little inconvenienced by the enormous crowd that pressed round us. Our clothes and arms were most minutely examined, and exclamations of "Heiyah!" were delivered by thousands. The *Furious*, *Cruiser*, and *Lee* arrived the next day, Monday 6th; and though they were of course objects of great curiosity, yet there was no such wonder manifested when they made their appearance as had been shown the previous day when the *Dove* arrived. We were the first Europeans that dropped anchor at Han-kow.

For a description of Han-kow I must refer you to the paper: the writer of that had far better opportunities than I had of gathering information. You will see there are three names mentioned in connection with this place, Woochang, Han-yang, and Han-kow. The first of these is the provincial capital of Hoonan, and is a large fortified city on the right bank of the river. Hanyang is a small city on the left bank opposite Woochang, and Han-kow is the commercial town adjoining it. Before the rebels were here the latter was the largest commercial city of the Chinese Empire; and considering that it is but a short time since it was nearly destroyed, it shows unmistakeable signs of being again a very wealthy city. This is the port mentioned in Lord Elgin's treaty, between which and the sea the Yang-tze-Kiang is to be opened to European commerce. You will see the whereabouts of all these places on the little map enclosed.

Sunday, 12th December.—We left Han-kow, and after a series of difficulties surmounted by the *Furious* and *Cruiser*, the whole of us arrived at Kew Kiang on the 20th, nine days accomplishing 120 miles. Moving on from day to day on our voyage up, no one appears to have thought of the possibility of the river falling; but during our stay at Han-kow several remarked it from the difficulty attending landing in places that at first were easy. This became a serious difficulty when the descent commenced. At Hwang Chow, 40 miles from Han-kow, a channel of 15 feet, just broad enough for the *Cruiser* and *Furious* to steam full speed through, was discovered; and at the 3 fathom bar on passing up, 10 miles above Kew Kiang, the *Furious* was bumped over 13 feet. Near the entrance to the Poyang Lake, however, the water had fallen since the 29th November 7 feet, leaving only 11 feet on the bar: over this it was impossible to get either *Furious* or *Cruiser*, and after having sounded and searched every part of the channel in the hopes of getting even a gutter with sufficient water to float them, it was resolved that the gun-boat should

proceed down the river and leave the *Furious* and *Cruiser* off Kew Kiang to remain there until the river rose (about April, 1859). Lord Elgin and his suite in the *Lee* and *Dove*, with twelve passengers, left Kew Kiang on Christmas Eve, arrived off Ganking the next evening, and the following morning passed without molestation the walls of that city. You will see by the paper what the rebels said of the affair in passing up, and we were not at all sorry to pass without blows. Had there been any firing, however, all we could have done would have been to fire our broadsides, and steam as fast as possible till out of reach of their guns. Our guns in the *Dove*, four 24-pounder brass howitzers, and a long 32-pounder, were all pointing at the city as we passed, loaded and primed; had the rebels fired, they would have soon been replied to. Came up with the *Retribution* at Woohoo on the evening of the 27th, and on the 29th the three vessels passed Nankin. The rebels were communicated with, and expressed sorrow at what had happened: they had evidently had enough of British warfare. All the forts were repaired, and seemed to be in better order even than when we passed up. Snow covered the hills, and occasionally showered down fresh supplies. Winter had set in in reality, and with it had disappeared from the heights the Imperialist army.

30th December.—Passed Silver Island, and anchored for the night about 25 miles below it. As it was expected there would be some delay in bringing the *Retribution* across the Langshan Crossing and beyond the Blonde Shoal, Lord Elgin decided in going on to Shanghai in the *Lee*, and leaving the *Dove* to assist in piloting the *Retribution*. His Lordship was very anxious to get down as soon as possible, and that there might be no delay, he wished Captain Ward to send one of the assistant surveyors to pilot the *Lee* down. I was selected, and we arrived at Shanghai about three days before the other ships. As had been anticipated, Langshan Crossing caused delay, "for during our absence up the river, the banks had altered so much that the little plan we made was of very little use; and the *Retribution* was brought over a patch of 3 and 3½ fathoms, where in searching for the channel in going up we had only 6 and 9 feet. So much for charting the Yang-tze-Kiang: it will never be expeditiously or safely navigated until there are local pilots distributed along the banks. To be thoroughly acquainted with the whole of it is next to impossible, for every 50 or 80 miles there must be a pilot, and he will have enough to do between the delays of piloting ships to make himself acquainted with the changes that have taken place. The most difficult part is from Wnsung to Langshan, and of course in the summer season, when the downward stream is at its greatest velocity, there will need careful men to handle ships higher up the river. Steamers of light draught will no doubt be the principal vessels employed."

The *Lee* arrived at Shanghai on New Year's-day, and great was the astonishment of the Shanghai folks to see his Lordship's flag at the main of a gun-boat: he landed amidst the saluting of English, French, and Russian men-of-war.

So ended the expedition up the great river of Yang-tze-Kiang. It has certainly been a most eventful and interesting one, but rather too long: had there been less delay in going up, it was intended to take the squadron into the large lake Toong-ting, about 100 miles above Han-kow; but all had begun to feel anxious to return when we arrived there, besides which the river falling warned us of the difficulty in returning, and every day's delay made it worse.

As soon as the news of the *Furious* and *Cruiser* being shut up in the river was made known, all haste was made in shipping provisions on board the *Nimrod* and *Opossum*, *Lee* and *Dove*, gun-boats, and the *Dove* got away on Saturday, 8th January, her decks crowded with stores and provisions and clothing, for both the vessels were hard up for almost everything. It was Captain Ward's intention to hurry on with all despatch, and getting rates for

chronometers at Kew Kiang, return again for a good meridian distance. Imagine our surprise therefore to see the *Dove* return at daylight on Monday with the gratifying news that the *Furious* and *Cruiser* were both approaching Wusung, having succeeded in just scraping over the bar near Poyang Lake. After we left them on Christmas Eve, rain fell in torrents for five or six days, and watching very carefully the marks they had painted on the rocks, they discovered the water rising. Losing not a moment, they got under weigh and proceeded to the bar, and the very minute there was sufficient water, crossed over. It was well they were so expeditious, for during the night the rain ceased, and a sharp frost setting in, the river fell in a few hours lower even than before. This is a most happy completion of all their labours. The prospect of a winter in the heart of China, ravaged as the country is by civil war, was by no means a cheering one; and, however much the Shanghai merchants regret the vessels' arrival here, as they say the gun-boats going up and down would have kept the navigation of the river open, yet to those on board the change is decidedly for the better. Kew Kiang for Shanghai—miserable, woe begone Chinamen for the cheering faces of their own countrymen.

While we have been in the Yang-tze, *Hooper*, *Kerr*, *Ellis*, and *Farmer* have completed the survey of the Wusung, from the entrance to 3 miles above Shanghai. There is a chart of it already, but the changes that have taken place since that was made require a resurveying of the river. To chart the Yang-tze in our late cruise was the principal object of our accompanying the expedition. All we could do, however, was to project by course and patent log, and to get observations whenever practicable. Our starting point was from San Shan Point, 12 or 13 miles above Nankin, and the last point in Collinson's survey. We measured a base by patent log, and carried on a running survey for about 80 miles; but here the hills left us for a considerable distance, and the points were lost. After this by patent log was all we attempted. From before daylight, when we had to plot courses by the light of a lantern, till dark in the evening, either Lieutenant Bullock or myself was on deck, sketching and plotting as we went. We had to keep our eyes about us, and were not at all sorry when each day's work was over. To me it was quite a new feature in surveying, collecting data and plotting it, going 5 to 7 knots an hour.

VII.—*On a New Projection of the Sphere.* By Sir J. F. W. HERSCHEL, Bart., K.H., D.C.L., F.R.S., &c. &c.

Communicated by Sir R. I. MURCHISON, Pres. R.G.S., &c. &c.

*Read, April 11, 1859.*

*Investigation of the conditions under which a spherical surface can be projected on a plane, so that the representation of any small portion of the surface shall be similar in form to the original.*

LET  $x, y$ , be the longitude and latitude respectively of any point on the surface of the sphere whose radius is unity, and let  $u, z$ , be the rectangular co-ordinates of the projection of that point on a plane, so that when  $x$  and  $y$  are determined,  $u$  and  $z$  will be so also, or, in other words, so that  $u$  and  $z$  shall be functions (indeterminate for the present) of  $x$  and  $y$ , either singly or both

together, and when  $x$  increases by  $dx$ , and  $y$  by  $dy$ , let  $u$ ,  $z$ , increase respectively by  $du$  and  $dz$ . Then we must have

$$\left. \begin{aligned} du &= M dx + N dy \\ dz &= P dx + Q dy \end{aligned} \right\} \dots (1)$$

where  $M$ ,  $N$ ,  $P$ ,  $Q$ , are all of them functions of  $x$ ,  $y$ .

The infinitesimal rectangle included between two infinitely near meridians differing in longitude by  $dx$ , and two circles of latitude differing in latitude by  $dy$ , will have for its sides respectively  $dy$  and  $dx \cos y$ , having to each other the ratio  $\frac{dx \cos y}{dy}$ ; the sides themselves including a right angle, ex hypothesi. Along the projection of one and the same meridian  $x$  does not vary. In passing, then, from the point whose projection is defined by  $u$ ,  $z$ , to that on the same meridian, whose projection is defined by  $u + du$ , and  $z + dz$ ,  $u$  and  $z$  must vary by the variation of  $y$  alone, or  $du = N dy$ ;  $dz = Q dy$ , and the interval from projected point to projected point, along the projected meridian, will be represented by  $dy \sqrt{N^2 + Q^2}$ . Similarly, in passing from projected point to projected point along a projected circle of latitude,  $x$  alone must be supposed to vary,  $y$  remaining constant; and the corresponding variations of  $u$ ,  $z$ , then will be  $M dx$  and  $P dx$ , and the projected interval between them  $dx \sqrt{M^2 + P^2}$ .

These, then, are the sides of the projected differential elementary figure corresponding to the infinitesimal rectangle on the sphere, and these two figures must be similar; which conclusion, being satisfied, obviously carries with it the similarity of any infinitesimal figure on the sphere and its projection. The sides, then, must be in the same ratio, and the angle they include a right one. The first of these conclusions gives, then, at once

$$\frac{dx \cos y}{dy} = \frac{\sqrt{M^2 + P^2}}{\sqrt{N^2 + Q^2}} \cdot \frac{dx}{dy}; \text{ or } \cos y = \frac{M^2 + P^2}{N^2 + Q^2} \dots (2)$$

The tangent of the angle made by the projected element of the meridian with the ordinate  $z$  is evidently represented by

$$\frac{\frac{du}{dx} dx}{\frac{dz}{dx} dx} \text{ or by } \frac{M}{P}, \text{ and that of the projected element of the circle of}$$

$$\text{latitude by } \frac{\frac{du}{dy} dy}{\frac{dz}{dy} dy} \text{ or } -\frac{N}{Q}, \text{ because, lying on opposite sides of}$$

the ordinate  $z$ , if one tangent be taken positively, the other must be taken negatively. The condition, then, of rectangularity re-

quires that the product of these tangents shall be = 1, which gives for the other essential equation

$$\frac{M}{P} \times -\frac{N}{Q} = 1, \text{ or } P Q = -M N \dots (3)$$

But by (2)

$$\cos y^2 = \frac{M^2}{N^2} \cdot \frac{1 + \left(\frac{P}{M}\right)^2}{1 + \left(\frac{Q}{N}\right)^2} = \frac{M^2}{N^2} \cdot \frac{1 + \left(\frac{P}{M}\right)^2}{1 + \left(\frac{M}{P}\right)^2} = \left(\frac{P}{N}\right)^2$$

whence we get, as the equivalents of (2) and (3), the following, viz. :—

$$\left. \begin{aligned} P &= N \cos y \\ M &= -Q \cos y \end{aligned} \right\} \dots (4)$$

Assume now

$$\alpha = \int \frac{dy}{\cos y} + x; \quad \beta = \int \frac{dy}{\cos y} - x;$$

which gives

$$dx = \frac{1}{2} (d\alpha - d\beta); \quad dy = \frac{1}{2} (d\alpha + d\beta) \cos y;$$

and we find by substituting these in the equations (1)

$$\begin{aligned} du &= \frac{1}{2} (P + M) d\alpha + \frac{1}{2} (P - M) d\beta \\ dz &= \frac{1}{2} (P - M) d\alpha - \frac{1}{2} (P + M) d\beta; \end{aligned}$$

whence adding and subtracting we obtain

$$\left. \begin{aligned} d(u + z) &= P d\alpha - M d\beta \\ d(u - z) &= M d\alpha + P d\beta \end{aligned} \right\} \dots (5)$$

The first members of these equations being complete differentials, the second must respectively be so also, and thus we find

$$\frac{dP}{d\beta} = -\frac{dM}{d\alpha} \quad \text{and} \quad \frac{dP}{d\alpha} = +\frac{dM}{d\beta}.$$

But universally

$$dP = \frac{dP}{d\alpha} d\alpha + \frac{dP}{d\beta} d\beta;$$

whence, substituting

$$dP = \frac{dM}{d\beta} d\alpha - \frac{dM}{d\alpha} d\beta \dots (6)$$

And again, the first member being a complete differential, the second must be such also, from which it follows that

$$\frac{d^2 M}{d\alpha^2} + \frac{d^2 M}{d\beta^2} = 0$$

an equation of partial differentials, whose complete integral is well known to be

$$M = \phi(\alpha + \beta \sqrt{-1}) + \psi(\alpha - \beta \sqrt{-1}) \dots (7)$$



Substituting this for  $M$  in the expression for  $dP$  in (6) reducing and integrating, we find

$$P = \sqrt{-1} \{ \phi(\alpha + \beta \sqrt{-1}) - \psi(\alpha - \beta \sqrt{-1}) \};$$

and putting for brevity

$$\begin{aligned} A &= \alpha + \beta \sqrt{-1} = \left( \int \frac{dy}{\cos y} + x \right) + \left( \int \frac{dy}{\cos y} - x \right) \cdot \sqrt{-1} \\ B &= \alpha - \beta \sqrt{-1} = \left( \int \frac{dy}{\cos y} + x \right) - \left( \int \frac{dy}{\cos y} - x \right) \sqrt{-1} \end{aligned} \quad \dots (8)$$

we find from (5)

$$d(u+z) = \sqrt{-1} \{ \phi(A) dA - \psi(B) dB \}$$

$$d(u-z) = \phi(A) dA + \psi(B) dB$$

which, by writing  $2F(A)$  for  $\int \phi(A) dA$ , and  $2f(B)$  for  $\int \psi(B) dB$ , affords the following values of  $u$  and  $z$ .

$$\begin{aligned} u &= (1 + \sqrt{-1}) \cdot F(A) + (1 - \sqrt{-1}) \cdot f(B) \\ -z &= (1 - \sqrt{-1}) \cdot F(A) + (1 + \sqrt{-1}) \cdot f(B) \end{aligned} \quad \dots (9)$$

in which  $F$  and  $f$  are the characteristics of any two functions, both completely arbitrary and independent.

Suppose, for example, we take  $F(\theta) = f(\theta) = \theta$ . Then

$$\begin{aligned} u &= (1 + \sqrt{-1}) A + (1 - \sqrt{-1}) B \\ &= (A + B) + \sqrt{-1} (A - B) \\ &= 2(\alpha - \beta) = 4x \end{aligned}$$

and

$$\begin{aligned} -z &= (1 - \sqrt{-1}) A + (1 + \sqrt{-1}) B \\ &= (A + B) - \sqrt{-1} (A - B) \\ &= 2(\alpha + \beta) = 4 \int \frac{dy}{\cos y} = 4 \log \tan \frac{90^\circ - y}{2} \end{aligned}$$

which is the law of Mercator's projection.

## II.

The equation (9) being subject to no restriction, it is evident that we may superadd to the general conditions of the problem any which will suffice either to determine altogether or to limit the generality of the arbitrary functions  $F, f$ , in the view of obtaining convenient forms of projected representations. Suppose, for instance, we assume as a condition that the projected representations of all circles about a fixed pole on the sphere shall be concentric circles about a fixed centre on the plane. Since the origin of the co-ordinates  $u, z$  is arbitrary, we will fix it in that centre; and since the condition is that when  $y$  is given, and there-

fore  $\int \frac{dy}{\cos y}$  is constant ( $= a$ ) the equation between  $u$  and  $z$ , shall be that of a circle about the centre, we have

$$u^2 + z^2 = r^2 = \text{a function of } y \text{ or of } a.$$

For brevity put

$$F(A) = X, \quad f(B) = Y$$

then we have

$$\begin{aligned} u &= (1 + \sqrt{-1}) X + (1 - \sqrt{-1}) Y. \\ -z &= (1 - \sqrt{-1}) X + (1 + \sqrt{-1}) Y. \end{aligned}$$

and substituting and reducing

$$u^2 + z^2 = 8 X Y$$

That is to say

$$F(A) \times f(B) = \frac{r^2}{8}$$

or putting  $e^{F(A)}$  for  $F(A)$ , and  $e^{f(B)}$  for  $f(B)$ , which we are at liberty to do without any sacrifice of generality.

$$F(\alpha + \beta \sqrt{-1}) + f(\alpha - \beta \sqrt{-1}) = \Psi(\alpha + \beta)$$

because

$$\alpha + \beta = 2 \int \frac{dy}{\cos y} = 2a$$

It does not appear that this equation can be satisfied by any forms of  $F$  and  $f$  more general than the following, viz. :

$$F(\theta) = (g + h \sqrt{-1}) \theta; \quad f(\theta) = (-h + g \sqrt{-1}) \theta$$

which give for the value of  $\Psi(\alpha + \beta)$

$$\{ (g - h) + (g + h) \sqrt{-1} \}. (\alpha + \beta)$$

or, which comes to the same thing,

$$2 \{ (g - h) + (g + h) \sqrt{-1} \} \int \frac{dy}{\cos y}$$

Practically speaking, this expression is useless, unless the imaginary term vanishes, or  $g + h = 0$ ,  $g - h = 2g$ , in which case it reduces itself to

$$4g \int \frac{dy}{\cos y} = 4ga$$

whence also

$$r^2 = 8e^{4ga}; \quad r = 2\sqrt{2} e^{2g \int \frac{dy}{\cos y}};$$

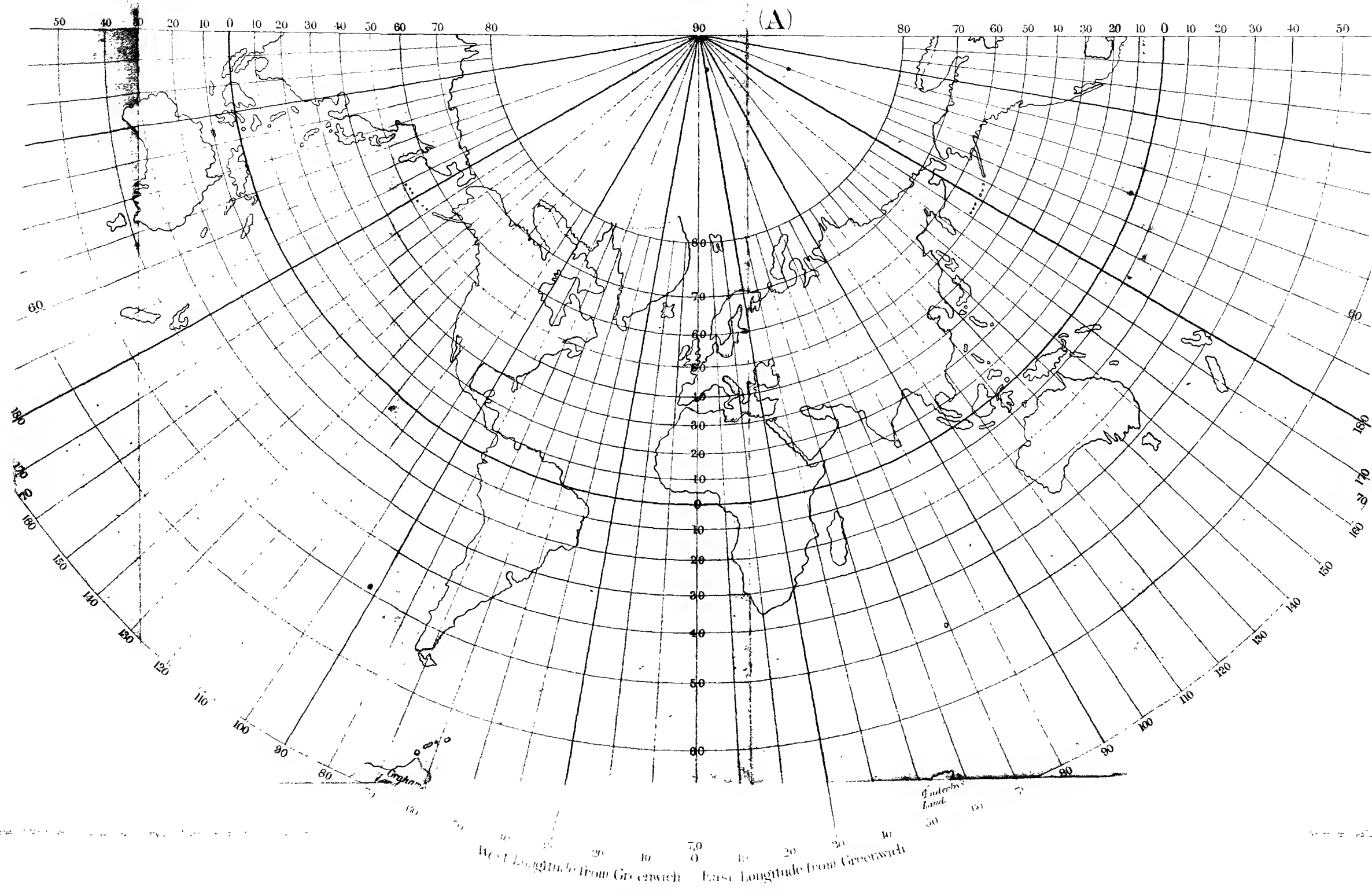
which since

$$\int \frac{dy}{\cos y} = \log \tan \frac{90 - y}{2}$$

reduces itself to

$$r = 2\sqrt{2} \left( \tan \frac{90 - y}{2} \right)^{2g}.$$





If  $g = \frac{1}{2}$ . This is the law of the stereographic projection, and the values of  $u$  and  $-z$  become

$$\begin{aligned}u &= 2r \{ \cos x + \sin x \} = 2r\sqrt{2} \sin (45^\circ + x) \\-z &= 2r \{ \cos x - \sin x \} = 2r\sqrt{2} \cos (45^\circ + x) \\r &= 2\sqrt{2} \tan \left( \frac{90 - y}{2} \right)\end{aligned}$$

In the more general case if  $2g = n$  we find

$$\begin{aligned}u &= 2r \{ \cos nx + \sin nx \} = 2r\sqrt{2} \sin (45^\circ + nx) \\-z &= 2r \{ \cos nx - \sin nx \} = 2r\sqrt{2} \cos (45^\circ + nx) \\r &= 2\sqrt{2} \left( \tan \frac{90 - y}{2} \right)^n\end{aligned}$$

To interpret these expressions we have only to consider that when  $x$  increases by any number of degrees,  $nx$  increases by  $n$  times that number, so that if  $n$  increases from 0 to  $360^\circ$ ,  $nx$  increases to  $n$  times  $360^\circ$ . The co-ordinates of the projection of any point, therefore, are those corresponding to  $n$  times the longitude in the case of the stereographic projection. If, then,  $n$  be a fraction less than unity, the projection of the whole spherical surface will, instead of occupying the whole of the area of a circle, be comprised within a sector, the same fractional part of the whole area. Thus if  $n = \frac{1}{2}$ , the projection of the whole sphere in longitude will be comprised within a semicircle; if  $n = \frac{1}{3}$ , within a sector of  $120^\circ$ ; if  $n = \frac{2}{3}$ , within  $240^\circ$ , &c.; and the entire parallels of latitude will in like manner be represented by the portions of concentric circles comprised between the extreme radii of these respective sectors.

If  $p$  be the polar distance of any parallel of latitude, and  $\theta$  the radius of the circular segment representing that parallel, we have, neglecting the co-efficient  $2\sqrt{2}$  or taking 1 for the equatorial radius in the projection,

$$\theta = \left( \tan \frac{p}{2} \right)^n$$

from which it is easy to calculate  $\theta$  for each polar distance from  $0^\circ$  to  $180^\circ$ . The values for the four cases  $n = 1, n = \frac{2}{3}, \frac{1}{2}, \frac{1}{3}$ ; for  $p = 0^\circ, 10^\circ, 20^\circ$ , &c., are set down in the following table:—

Values of $n$ .					Values of $n$ .				
	$n = 1$	$n = \frac{2}{3}$	$n = \frac{1}{2}$	$n = \frac{1}{3}$		$n = 1$	$n = \frac{2}{3}$	$n = \frac{1}{2}$	$n = \frac{1}{3}$
$p =$	$\theta =$	$\theta =$	$\theta =$	$\theta =$	$p =$	$\theta =$	$\theta =$	$\theta =$	$\theta =$
0	0°000	0°000	0°000	0°000	80	0°839	0°890	0°916	0°943
10	0°087	0°197	0°296	0°444	90	1°000	1°000	1°000	1°000
20	0°176	0°314	0°420	0°561	100	1°192	1°124	1°092	1°060
30	0°268	0°416	0°518	0°645	110	1°428	1°268	1°195	1°126
40	0°364	0°510	0°603	0°714	120	1°732	1°442	1°316	1°201
50	0°466	0°601	0°683	0°776	130	2°144	1°663	1°464	1°290
60	0°577	0°693	0°760	0°833	140	2°747	1°962	1°657	1°401
70	0°700	0°788	0°837	0°888	150	3°732	2°406	1°932	1°551
80	0°839	0°890	0°916	0°943	160	5°671	3°173	2°381	1°783

The first series of numbers exhibits the projection of the radii of the successive projected parallels in the stereographic projection; the second, in that which occupies a section of  $240^\circ$ , such as by cutting out the unoccupied portion would roll up into a cone, well adapted for a transparent map on a lamp-shade; the third, in that which occupies a semicircle (exhibited in fig. B), a convenient form for a reference chart, rejecting lateral continuations, but which becomes too much distended beyond the 55th parallel of south latitude; and the last, that comprised in a sector of  $120^\circ$ , as in figure A, which is preferable to either, and seems to me not unlikely to supersede all other projections for a general chart.

#### VIII.—Description of the Projection used in the Topographical Department of the War Office for Maps embracing large portions of the Earth's Surface.\*

Communicated by COLONEL SIR HENRY JAMES, R.E., F.R.G.S., &c.,  
Director of the Topographical Department.

THE method of development adopted in the Topographical Department for the construction of the maps of North and South

SIR,

\* Ordnance Survey Office, Southampton, 2nd July, 1858.

The projection which I have adopted for the construction of maps embracing large areas possesses, as I conceive, great advantages over any other with which I am acquainted; and thinking that a description of the mode of constructing such maps, with a table of the lengths of the radii of the arcs of parallels, and the distances between the meridians on the several parallels, which renders the construction on any scale extremely easy, would be acceptable to the Royal Geographical Society, I requested Captain Alexander Clarke, R.E., to draw up the following account of the method employed by us. Every meridian in this projection cuts the parallels at right angles, and the distortion (which is incidental to every projection) is in this diminished to a greater extent than in any other.

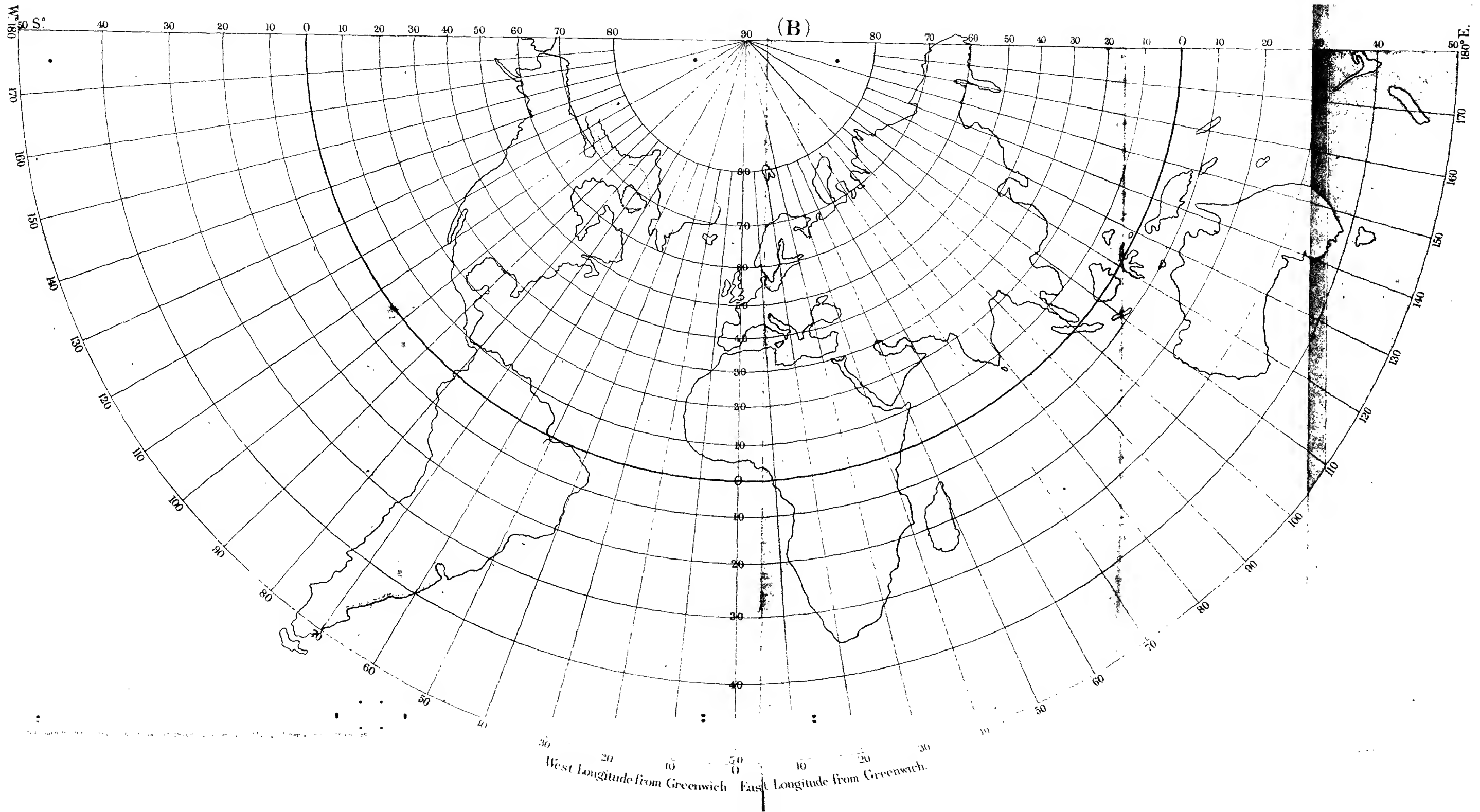
I am, Sir, your obedient servant,

HENRY JAMES, Colonel Royal Engineers,

Director Topographical Department.

Norton Shaw, Esq.,

Secretary Royal Geographical Society.





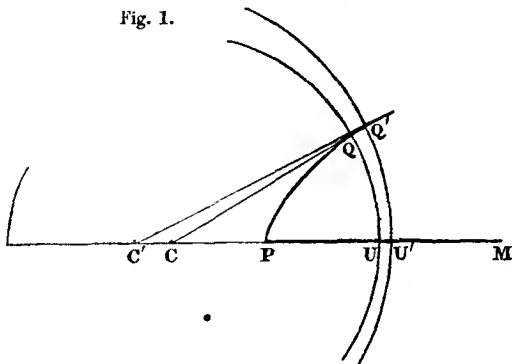


America differs from any that has been hitherto employed, and has several advantages which seem to give it a claim to special notice.

1. Every projection or method of development, when applied to a very large tract of country, such as Asia, must necessarily exhibit distortion. If, as in the Stereographic or Mercator's Projection, we maintain the correct representation of all small portions, considered merely in themselves, and without reference to adjoining parts, we must put up with considerable distortion of areas or of the linear scale; and if, on the other hand, we endeavour to avoid this misrepresentation of area, we must have a distortion of form in the small portions—squares on the actual surface being developed into parallelograms, often very oblique. In the system of development which forms the subject of this paper, every square on the actual surface having its sides parallel and perpendicular to the meridian becomes in the development a rectangle having its meridional dimensions greatest.

2. Imagine a hollow globe formed of a mere surface of paper; suppose it actually cut by a great number of parallel planes along equidistant parallels of latitude; let also one meridian (from North Pole to South Pole,  $180^\circ$ ) be entirely cut through. In this state let the whole be opened out into a plane from the meridian exactly opposite to the one cut through, and the previously spherical surface is converted into a number of strips of paper, each of which is part of a circular belt, with the exception of the equator, which will be straight. All points which lay on the parallel whose colatitude is  $u$  on the sphere, now lie on the arc of a circle whose radius is  $\tan. u$  and length  $2\pi \sin. u$ ; moreover, the centres of all these arcs or circular strips lie in the same straight line, viz. the central meridian. In fig. 1, let P be the North Pole, PM the

Fig. 1.



central meridian, U any point in that meridian whose latitude is  $90 - u$ . Make  $PU = u$ ,  $UC = \tan u$ , and, with C as a centre,

describe the circular arc  $UQ$ . This arc will represent the parallel of latitude passing through  $U$  on the sphere, and the curves which cut all circles described according to this law ( $u$  variable) at right angles, are taken to represent meridian lines. To investigate the nature of this curve take another point,  $U'$  indefinitely near to  $U$ , and let  $UU' = du$ ,  $U'C' = \tan(u + du)$ , and with the centre  $C'$  and radius  $C'U'$  describe the circular arc  $U'Q'$  indefinitely near to  $UQ$ . Let  $PQQ'$  be a part of one of the curves we are investigating; join  $CQ$ ,  $C'Q'$ ; these lines will—being perpendicular to the circles—be tangents to the curve. Let  $UCQ = 2\phi$ ;  $U'C'Q' = 2(\phi + d\phi)$ , then the small angle  $CQC'$  or the inclination of the tangents at  $Q$  and  $Q'$  will  $= 2d\phi$ . Now,

$$\begin{aligned} CC' &= C'U' - CU - UU' \\ &= \tan(u + du) - \tan u - du \\ &= \tan^2 u \cdot du \end{aligned}$$

And from the triangle  $QCC'$

$$\begin{aligned} \tan^2 u \cdot du \cdot \sin 2\phi &= -2 \tan u d\phi \\ \therefore -\tan u \cdot du &= \frac{2d\phi}{\sin 2\phi} \end{aligned}$$

Integrating this equation, we have

$$\begin{aligned} \log \cos u &= \log \tan \phi + \text{constant} \\ \therefore \tan \phi &= w \cos u \end{aligned}$$

Where  $w$  is a constant determining any one particular curve.

3. To determine in what point this cuts the equator, we observe that the distance of any point  $Q$  in the curve from the central meridian is  $\tan u \cdot \sin 2\phi$ ; which

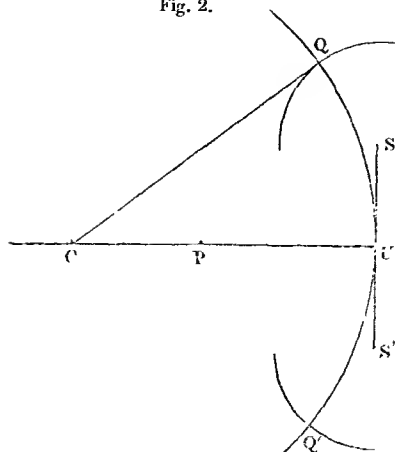
$$= \frac{2 \tan u \tan \phi}{1 + \tan^2 \phi} = \frac{2w \sin u}{1 + w^2 \cos^2 u}$$

and this at the equator  $= 2w$ .

Let any equatorial point whose actual longitude is  $2w$  on the sphere be represented by a point on the developed equator at the distance  $2w$  from the central meridian; then, remembering that in colatitude  $u$  the radius of parallel is  $\sin u$ , we have the following simple construction:—

4. Let  $P$  (fig. 2) be the pole,  $U$  any point in the central meridian;  $QUQ'$  the circular arc representing the parallel through  $U$ . Draw the tangent  $SUS'$  perpendicular to  $PU$  through the point  $U$ : then to determine the point  $Q$  whose longitude is given (say  $3^\circ 0'$ ) lay off  $US$  equal to half the true length of the arc of parallel on the sphere ( $1^\circ 30'$ , to radius  $\sin u$ ), and with the centre  $S$  and distance  $SU$  describe a circular arc which will intersect the parallel in the required point  $Q$ . For if we

Fig. 2.



suppose  $2w$  to be the longitude of the required point  $Q$  (whose colatitude is  $u$ ),  $US$  is by construction equal to  $w \sin u$ , and since  $CU = \tan u$ , the angle subtended by  $SU$  at  $C$  is

$$\tan^{-1} \left\{ \frac{w \sin u}{\tan u} \right\} = \tan^{-1} (w \cos u) = \phi$$

and therefore  $QCU = 2\phi$ , and the distance of  $Q$  from the central meridian  $CU$  is  $\tan u \sin 2\phi$ , as it should be

This very simple construction was given to me by Mr. O'Farrell, of this office, who obtained it from an ingenious process of trial and error.

The advantages of this method are that, with a remarkably facile construction, we have a map in which the meridians and parallels intersect at right angles, and the effect is pleasing to the eye. The circles for parallels are drawn in the usual manner, but the meridians, not being circular arcs, may be drawn in after the construction of the points of intersection by suitable mechanical curves.

5. The radius of curvature of the meridian whose longitude is  $2w$ , at the colatitude  $u$ , is readily determined. In the first figure we have  $C'Q' = CQ + CC' \cos 2\phi + QQ'$ . Here  $QQ'$  is the element of length of the curve, or  $QQ' = ds$ , also  $CC' = \tan^2 u \cdot du$ ; therefore we have

$$\begin{aligned} ds &= (\sec^2 u - \tan^2 u \cos 2\phi) du \\ &= \left( 2(1 + w^2) \cos^2 \phi - 1 \right) du \end{aligned}$$

Also  $\sec^2 \phi d\phi = -w \sin u du$ ; therefore, if  $\rho$  be the radius of curvature of the meridian, we have, by substitution,

$$\rho = \frac{1 + w^2 + w^2 \sin^2 u}{2 w \sin u}$$

6. Let us now consider the distortion, and, for this purpose, imagine a small square described on the surface of the sphere having its sides parallel and perpendicular to the meridian. Let  $u$  and  $2w$  define its position, and let  $i$  be the length of the side. If we differentiate the equation  $\tan \phi = w \cos u$  on the supposition of  $u$  being constant, we have

$$\sec^2 \phi d\phi = \cos u dw$$

also the length of the representation of  $2 dw$  is  $2 \tan u d\phi$ , or

$$\sin u \cos^2 \phi d \cdot 2w$$

Hence that side of the square which is parallel to the equator will be represented by a line equal to

$$i \cos^2 \phi$$

similarly the meridional side will be represented by a line equal to

$$i \cos^2 \phi (1 + w^2 + w^2 \sin^2 u)$$

The square, therefore, is represented by a rectangle whose sides have the proportion

$$1 + w^2 + w^2 \sin^2 u : 1$$

and its area is increased in the proportion of

$$\frac{1 + w^2 + w^2 \sin^2 u}{(1 + w^2 \cos^2 u)^2} : 1$$

If we make this ratio equal to unity, there results the following equation—

$$w^4 \cos^4 u + 3 w^2 \cos^2 u - 2 u^2 = 0$$

which is satisfied either by  $w = 0$ , or by

$$w^2 \cos^4 u + 3 \cos^2 u - 2 = 0$$

From this it appears that there is no exaggeration of area along the meridian or along the particular curve which is defined by the equation just written down. This curve crosses the central meridian at right angles in the latitude of about  $54^\circ 44'$ ; it thence slowly inclines southward, and at  $90^\circ$  of longitude from the central meridian reaches  $50^\circ 26'$  of latitude; at  $180^\circ$ , or the opposite meridian, it has reached  $43^\circ 46'$ . The areas of all tracts of countries lying on the north side of this curve will be diminished in the representation, and for all tracts of country south of this curve the areas will be increased in the representation.

7. This method is particularly well adapted for the construction of maps of continents, and even in the map of Asia there is very little distortion, as may be seen by an examination of the lines



*Diagram.*  
showing the application of  
Table p III to the Projection  
of a portion of the surface of  
the Earth (including Europe)  
North of the Parallel of  $30^\circ$

$B'$

For these parallels the Table  
furnishes the following quantities

Lat	Radius for Parall	Degree or Longit
$30^\circ$	93 239	86603
$40^\circ$	68 282	76604
$50^\circ$	48 077	64279
$60^\circ$	33 080	50000
$70^\circ$	20 854	34202
$80^\circ$	10 103	17365

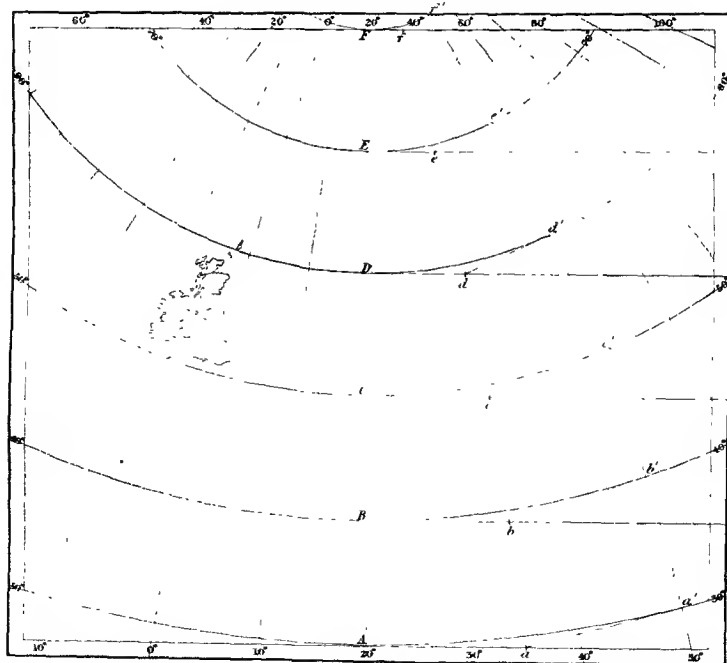
$C'$

$D'$

$\frac{F'}{P}$

Scale

10 0 10 20 Degrees



Explanation The line ABP is the central Meridian P the North Pole Make  $AP = 93^\circ$  and set off  $AB = BC = CD = DE = EF = FP = 10^\circ$  each. The points A' beyond the margin, B', C', D', E', F', G', H', I', J', K', L', M', N', O', P', Q', R', S', T', U', V', W', X', Y', Z' are the centres of the circles passing through A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, V, W, X, Y, Z respectively, and are determined by making  $AA' = 90^\circ 239$ ,  $BB' = 68^\circ 282$ ,  $CC' = 48^\circ 077$ ,  $DD' = 33^\circ 080$ ,  $EE' = 20^\circ 854$ ,  $FF' = 10^\circ 103$ , which numbers are found opposite their corresponding Latitudes in Table p III.

To draw a Meridian, draw that of  $30^\circ E$ , which is  $90^\circ$  of longitude from ABP. Through A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, V, W, X, Y, Z draw the lines Aa, Bb, Cc, Dd, Ee, Ff, Gg, Hh, Ii, Jj, Kk, Ll, Mm, Nn, Oo, Pp, Qq, Rr, Ss, Tt, Uu, Vv, Ww, Xx, Yy, Zz perpendicular to ABP and make  $Aa = 10^\circ \times 93 = 930$ ,  $Bb = 10^\circ \times 68 = 680$ ,  $Cc = 10^\circ \times 48 = 480$ ,  $Dd = 10^\circ \times 33 = 330$ ,  $Ee = 10^\circ \times 20 = 200$ ,  $Ff = 10^\circ \times 10 = 100$ ,  $Gg = 10^\circ \times 0 = 0$ ,  $Hh = 10^\circ \times 0 = 0$ ,  $Ii = 10^\circ \times 0 = 0$ ,  $Jj = 10^\circ \times 0 = 0$ ,  $Kk = 10^\circ \times 0 = 0$ ,  $Ll = 10^\circ \times 0 = 0$ ,  $Mm = 10^\circ \times 0 = 0$ ,  $Nn = 10^\circ \times 0 = 0$ ,  $Oo = 10^\circ \times 0 = 0$ ,  $Pp = 10^\circ \times 0 = 0$ ,  $Qq = 10^\circ \times 0 = 0$ ,  $Rr = 10^\circ \times 0 = 0$ ,  $Ss = 10^\circ \times 0 = 0$ ,  $Tt = 10^\circ \times 0 = 0$ ,  $Uu = 10^\circ \times 0 = 0$ ,  $Vv = 10^\circ \times 0 = 0$ ,  $Ww = 10^\circ \times 0 = 0$ ,  $Xx = 10^\circ \times 0 = 0$ ,  $Yy = 10^\circ \times 0 = 0$ ,  $Zz = 10^\circ \times 0 = 0$ . The curve line connecting the points a, b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z is the projection of this Meridian. The same quantities serve for drawing the Meridian  $30^\circ$  on the left hand side of ABP and similarly for the other Meridians.

in the accompanying figure, which is sufficient to embrace the whole of Asia. If we represent the surface of the whole globe continuously, the area of the representation is

$$(4 + \pi^2) \tan^{-1} \frac{\pi}{2} + 2\pi$$

which is greater than the true surface of the globe in the proportion of 8 to 5. The perimeter of the representation is equal to the circumference of the globe multiplied by  $\sqrt{4 + \pi^2} - 1$ , or 2.72.

The following Table contains the lengths of the radius for the different arcs of parallel, and also the lengths of a degree of longitude in different latitudes; the unit of length being that chosen for one degree at the equator. By the aid of this Table the construction of a projection on any scale is rendered extremely simple.

Lat.	Radius for Parallel.	Degree of Longitude.	Lat.	Radius for Parallel.	Degree of Longitude.	Lat.	Radius for Parallel.	Degree of Longitude.
0	$\infty$	1.00000	30	99.239	.86603	60	33.080	.50000
1	3282.473	.99985	31	95.356	.85717	61	31.760	.48481
2	1640.736	.99939	32	91.692	.84805	62	30.465	.46947
3	1093.268	.99863	33	88.228	.83867	63	29.194	.45399
4	819.368	.99756	34	84.944	.82904	64	27.945	.43837
5	654.894	.99619	35	81.827	.81915	65	26.717	.42262
6	545.133	.99452	36	78.861	.80902	66	25.510	.40674
7	466.637	.99255	37	76.034	.79864	67	24.321	.39073
8	407.681	.99027	38	73.335	.78801	68	23.149	.37461
9	361.751	.98769	39	70.754	.77715	69	21.994	.35837
10	324.940	.98481	40	68.282	.76604	70	20.854	.34202
11	294.761	.98163	41	65.911	.75471	71	19.729	.32557
12	269.556	.97815	42	63.633	.74314	72	18.617	.30902
13	248.175	.97437	43	61.442	.73135	73	17.517	.29237
14	229.801	.97030	44	59.331	.71934	74	16.429	.27564
15	213.831	.96593	45	57.296	.70711	75	15.352	.25882
16	199.814	.96126	46	55.330	.69466	76	14.285	.24192
17	187.406	.95630	47	53.429	.68200	77	13.228	.22495
18	176.338	.95106	48	51.589	.66913	78	12.179	.20791
19	166.399	.94552	49	49.806	.65606	79	11.137	.19081
20	157.419	.93969	50	48.077	.64279	80	10.103	.17365
21	149.261	.93358	51	46.397	.62932	81	9.075	.15643
22	141.812	.92718	52	44.764	.61566	82	8.052	.13917
23	134.980	.92050	53	43.175	.60181	83	7.035	.12187
24	128.688	.91355	54	41.628	.58779	84	6.022	.10453
25	122.871	.90631	55	40.119	.57358	85	5.013	.08716
26	117.474	.89879	56	38.646	.55919	86	4.007	.06976
27	112.449	.89101	57	37.208	.54464	87	3.003	.05234
28	107.758	.88295	58	35.802	.52992	88	2.001	.03490
29	103.364	.87462	59	34.427	.51504	89	1.000	.01745
30	99.239	.86603	60	33.080	.50000	90	0.000	.00000

Degree of Equator = Degree of Meridian = 1.  
Radius of sphere = 57.2958.

IX.—*A General Historical Description of the State of Human Society in Northern Central Africa.* By H. BARTH, Phil. D.

*Read, May 10, 1858.*

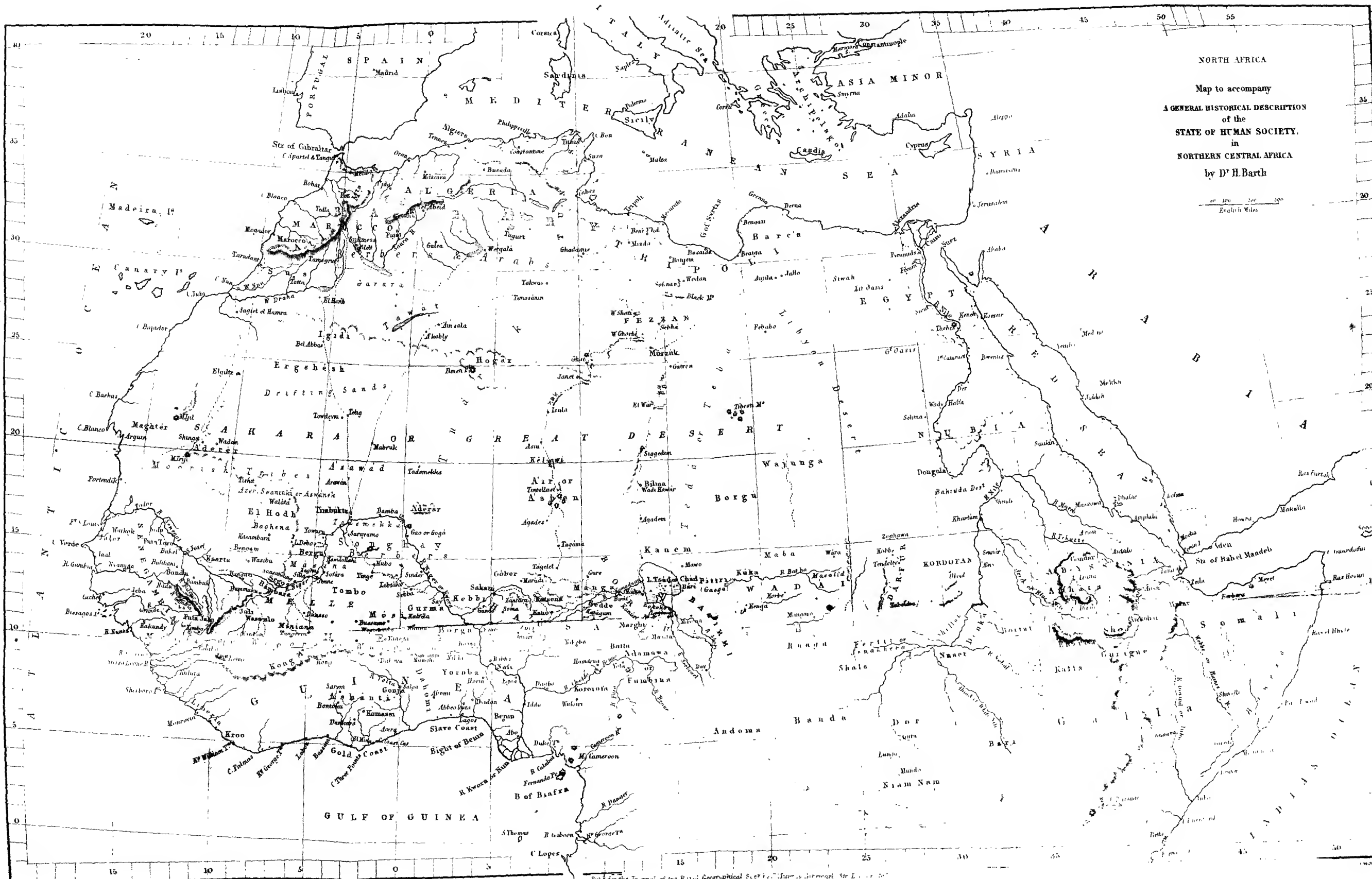
I. I SHALL first make a few introductory remarks on the physical features of Northern Central Africa in general.

I here take that part of the continent which rather deserves the name of North-Africa, together with the more central portions, and consider the general features of that immense tract of country which from a line drawn across the continent along the parallel of the Slave and Gold coast, and cutting off the widely-projecting headland of the Somal's coast, extends in an east-westerly direction through from 50 to 60, and from south to north through a breadth of about 25, degrees. In my further remarks, however, I shall confine myself more to the interior regions inclosed in this northern broadest half of the African continent, although occasionally I shall be obliged to include the seaboard in the range of my observations. There is a great number of gentlemen in this Society who would be able to give to the meeting a by far more accurate account of the country near the seaboard than I am able to give. I shall also exclude from my general view the highly interesting group of Abyssinia and the neighbouring countries, which in every respect forms quite a region of its own, and has scarcely any intercourse with the rest of the African interior.

If we now look at that broad extent of country about which I am speaking, the most characteristic feature is its uniform nature, as well with regard to its outline as with respect to its interior. In the outline of this continental territory, as hemmed in by the ocean, the only considerable indentations which we observe are on the east side, the deeply indented Arabian gulf, nearly insulating the whole African continent, on the south-west side the bight of Benin, and on the northern coast the two Syrtis.

If we now regard the interior of this immense tract, we first have to observe that broad belt of sterile land intervening between the northern fertile zone along the Mediterranean, which in the west reclines on the slope of the Atlas chain and its minor branches, and the fertile lands of the tropical region to the south; while towards the east this vast desert tract is bordered by the large basin of the Nile, running from south to north through a breadth of nearly 30 degrees, and towards the south-west by the Niger, or however we may call that great river which in an immense curve sweeps into the interior as far as the 18th degree of N. latitude, and which has been an object of the highest attraction and interest in this country from the very beginning of the glorious proceedings of the African Association.





NORTH AFRICA  
Map to accompany  
A GENERAL HISTORICAL DESCRIPTION  
of the  
STATE OF HUMAN SOCIETY,  
in  
NORTHERN CENTRAL AFRICA  
by Dr H. Barth

Scale in English Miles



In the midst, between these two immense rivers, connected with the lower course of the Nile by another line of oases, a long line of more favourable localities and of inhabitable oases stretches out through Fezzán and the country of Tebu, forming a natural link between the Mediterranean and the central regions with their central basin, the Tsád or Chád. Towards the west, opposite the great bend of the Niger, where it enters the very heart of the African desert, Nature has provided an outlying inhabitable spot, the oasis of Tawát, the southernmost places of which, namely Insálah and A'kabli, are situated nearly on a parallel with Murzuk, the capital of Fezzán, and thus affords an easier access to the Niger, while at the same time it forms a point of junction with the middle routes to Negroland.

*Mountains.*—However, the desert is not a deep sink as was generally supposed before the period of our exploration, but rather an elevated tract of a mean elevation of from 1000 to 1400 feet, mostly consisting of rock, namely sandstone or granite, the latter being overlaid in the heart of the desert by vast tracts of gravel, while the sandstone region forms many elevated plains of larger or smaller extent, strewn with small pebbles. Several mountainous groups are found in different quarters of this region, the most prominent being Tibesti, the country of the north-western Tebu; A'sben or A'ír, the territory of the Kél-owí; the two mountainous regions called by the name A'derér or A'derár, the one near the great north-easterly bend of the Niger, the other in the western part of the desert, near the town of Tishít; and the A'takór, or the mountain group of the Hogár, near Tawát. These mountainous tracts, while they slightly increase the difficulty of the passage for caravans, nevertheless are of the highest importance, not only for the temporary intercourse of travellers and merchants, but even as affording a dwelling-place to a tolerably numerous nomadic population, which, but for these more favoured localities, could scarcely exist in the desert. But of course the cultivable or even inhabitable localities which these mountain clusters afford are very limited, and while the open desert is the most healthy residence, the ravines formed by those mountains are rather the contrary, and become a hotbed of fever in the same degree as they are better provided with moisture, and thus are more favourable for cultivation. However, some of these ravines are rich in springs, and capable of producing a variety of fruit, especially grapes and figs. I will here only mention the deep gutter of the valley Más, or Jánet, to the south-west of Ghát, and the celebrated valley of Temásauín, the point of junction of the roads from Tawát to Ghadamis and from Ghít to Wargelá, and which contains small alpine lakes, which are even capable of

breeding alligators. But it is a characteristic feature that all these mountains are destitute of timber, while only the valleys produce middle-sized trees.

*Sandhills.*—A very remarkable feature in the desert, and of the highest importance for the direction of the great commercial highroads, are the *Regions of Sandhills*. But these regions are of a twofold and totally different character, the one consisting of ridges of sand of more or less elevation and of different breadth, but running almost constantly in a direction from E.N.E. to W.S.W. We ourselves on our outward journey crossed one of these most difficult tracts in lat.  $27^{\circ}$ , between Wádi Scháti and Wádi Gharbi, having a breadth in a direct line of 60 geographical miles. From the point mentioned, this zone of sandhills, with an occasional interruption, stretches to the north of Ghát and to the south of Tawát, with very little elevation; but to the south-west of Tawát vast regions of sandhills are formed, stretching through the districts of Ergshésh, Gídi or Igídi, and Warán, to the almost impassable zone of Maghtér, between Ijil and the Atlantic. However difficult this belt of sandhills may be for the passage of caravans where they are obliged to cut straight across the various ridges, which in many instances reach the elevation of from 800 to 1000 feet, nevertheless this formation is not so unfavourable for human existence, as a great deal of moisture is collected in the sinks or depressions between the various ridges; so that in most of the regions which I have just mentioned a large supply of dates is produced, which are sufficient for sustaining a moderate population, although man is not enabled to fix his residence for any length of time in these shifting sandhills. Totally different from these zones of *sand-ridges* is the formation of *isolated sandhills*, called A'kela, or Aukár, or Eríggi, which are incapable of collecting any amount of moisture, and are generally totally destitute of water, the temporary nomadic inhabitants relying for their supply of the watery element upon water-melons, in which these tracts are generally rich.

With regard to the principal features of the desert I will only add, that one of its most characteristic features is the immense change of temperature. Here we find the greatest heat in summer, and a degree of cold in winter which approaches that of by far more northerly latitudes, the difference between maximum and minimum being as much as  $80^{\circ}$ , and probably more. With regard to the supposed dryness of these sterile tracts, it has been greatly exaggerated, occasional showers refreshing these hot regions, at least along the more favoured line, which is followed by the caravans, and even along the sterile tract by way of the Tebu country. I had an occasional light shower of rain in the

month of June, 1855, as far north as nearly the 19th degree of N. latitude; and the same was experienced by us on our outward journey, in 1850, about the same season.

*The Fertile Regions.*—About the general character of the fertile regions of Negroland I will not here speak: my volumes contain material enough for any body who wants more particulars about them. I will only say, that although the immense chain of the Mountains of the Moon does not exist, as it had been supposed, the interior of these regions is not at all of that uniform and monotonous character which seems to be now presumed by most people. Of course alluvial tracts of countries, such as the greater part of Bornu, cannot be but of a uniform and most monotonous character, and in this respect they must resemble the immense plains of the Ganges and Indus; but on the other hand, if we do not take into regard the vast chains of the Himalayas, which rather borders India than forms part of it, the whole of Inner Africa, as far as it fell under my observation, seems quite as varied as any part of India. Mountains between 5000 and 6000 feet are not at all rare, and most beautiful and picturesque glens and valleys are formed by them. Unfortunately we have not yet any positive knowledge of that vast mountainous region which feeds the sources of the Niger, Senegal, and Gambia, and which seems to be a most interesting country. The general middle altitude of mountainous tracts is 2500 feet.

II. I now proceed to make a few observations on the manner in which the population, as far as we are able to discern from the traces such as are distinguishable in the dim light which has as yet been thrown upon this difficult subject, settled down in the regions thus pointed out.

We acknowledge distinctly one stream of population extending from Syria along the seacoast to the far west, and thence thrown back by the Atlantic; and in consequence of the pressure applied to it by a supervening stream of a different character, but coming likewise from the east, returning southward. This is the great North African race—the *Berbers* or *Mazigh*, who still at the present day, in various shades and degrees of intermixture with Arabs and Negroes, form the principal stock of the whole population of North Africa, from Cape Spartel and Rás Adár, or Cape Bon, as far as the Senegal and Niger.

We observe another stream of emigration proceeding from South Arabia through Sennár and Abyssinia, and pushing on till meeting the other stream from the north. But while the principal race of North Africa, like that of South Africa, has preserved most distinctly its unity and connexion, the mixture and shading of tribes in the fertile lands of Negroland, between the 5th and 15th, and in some places the 16th degree of N. latitude,

has been going on in such a remarkable manner that only the most accurate study of the idioms of all these tribes can furnish us with a thread which may lead us with some degree of security through this ethnographic labyrinth.

I will point out the principal seats of the most conspicuous among these tribes of Central Negroland, and will attempt, from an historical point of view, to give a few characteristic features of them. But I first beg to call attention to a very remarkable fact which ethnologists, who make any attempt at deciding the most intricate question with regard to the origin of the human race, must not leave out of their view. For although we see already plainly from the Egyptian sculptures that even as early as thirty centuries before our era the black race of negroes was distinctly developed, yet it is a very remarkable fact that nearly all the tribes which I have to mention include two distinct classes, one of a lighter, and the other of a darker shade. Thus we find that the tribe of the Másina, a section of the great Mandingo, or Wákorē stock, who originally were settled in Tishít, consisted of two distinct classes, one white (that is to say of a lighter complexion), the other black. The Jolof and Fúlbe are only different branches of the same original race, Jolof meaning "black," and Pullo, the singular tense of Fúlbe, meaning "red." Thus also among the Berbers we find a good many tribes which are divided into two distinct classes; the Blacks, or "Esáttafnén;" and the Whites, or "Eméllulén;" and the same distinction with regard to colour in the same tribe I myself found among the tribes to the south of Bornu, and a similar phenomenon has been observed by other travellers in other regions.

In speaking of the principal tribes of Northern Central Africa I have first again to mention the Berbers, who, although properly belonging to North Africa, yet, as the propagators of Islám and of Mohammedan civilization in general, and as the founders of well-organized kingdoms and dynasties in the fertile regions of Negroland, deserve here to be mentioned in the first rank. Even for Europeans attempting to open intercourse with those regions from the mouth of the Niger this tribe must be considered as of the very highest importance, as being in possession at the present time, and dominating the whole middle course of the Niger from near Say up to Timbúktu.

The *Berbers* are of immense importance in the whole question of African and Asiatic ethnography, as a link between various and most distant races. They were known already to the ancient Egyptians in their seats near Aújila, and are represented by them in their sculptures with the characteristic feature of the long curl on the right of the head, their earrings, and their light colour, and with their name Maha (Mazígh).

The Berbers are capable of great development, of the finest bodily frame, very tall and muscular, full of intelligence, application, industry, and warlike disposition. In former times they were organizing and founded mighty kingdoms, not only in the northern region, called by us Barbary, but also in the south, on the very border of Negroland. At present, in the regions towards the north, they are intermixed with the Arabs, having lost a great portion of their nationality; and in the regions towards the south they are broken up into smaller fractions, which only, in consequence of some momentary pressure, acknowledge the supremacy of some paramount chief.

The Berbers, more or less influenced by Arabic civilization, and speaking dialects greatly intermixed with Arabic, constitute the principal part of the population of the whole of Barbary under the various names of Bréber, Zenáta, Shillúh, and Shawia, to the numbers of between 7,000,000 and 8,000,000. As free Imóshagh, retaining the greater part of their original nationality in their seats between Fezzán, the southernmost frontier of Algeria, and Tawát, on the one, and Hausa and the Niger on the other side, they may number from 150,000 to 200,000. Moreover, the Moorish tribes settled in the western half of the desert, between the route leading from Tawát to Timbúktu and the Atlantic, have been greatly intermixed with Berber elements, and absorbed whole tribes which once constituted the chief and most distinguished sections of the Berber family.

The Berbers in their political and intellectual inroad of Negroland principally came in contact with three nations: the Kanúri, on the north and south side of the Tsád; the Songhay, on the north-eastern bend of the Niger; and the great race of the Wangarawa, or Mandingo, to the west of the great northerly bend, and on the various branches of the upper course of the Niger.

I now proceed to make a few remarks about this important tribe of the Wangarawas, or, as they are generally called, the *Mandingoes*. The name Mandingo does not seem to belong to the nation in general, but only to its south-westernmost fractions. I once thought that it was entirely of European origin, and proceeded from a corruption of the term Mellinké, inhabitant of Melle; but Mandi is the name of a section of the whole tribe. The common name of the race in Timbúktu and thereabout is Wangara, pl. Wangarawa; and this term, which has puzzled geographers so much and has caused so much dispute about a country Wangara, is nothing but the name of the Mandingoes. The meaning, therefore, is neither "gold country" nor "swampy region," although the Wangarawa are the chief traders in gold, and most of their regions are richly provided by nature with this

metal, besides that they are watered by numbers of rivers and smaller watercourses. What I have here said explains fully the fact that the name Mandingo is not mentioned by earlier writers.

The Wangarawa, although in general they exhibit the principal features of the Negro type, and although a considerable diversity prevails among the various sections of this nation, are, generally speaking, a fine race, and are capable of a high degree of civilization and intelligence, well disposed to trading, and great travellers—even the principal traders in Kátsena being Wangarawa—and capable of political organization. Thus they have founded the powerful and flourishing kingdom of Melle, of which I shall say more farther on, and in more modern times in a certain degree that of Bámbara. They were also the first who adopted Islám, and hence the steady propagators of Islamism, sending their missionaries down to the very shores of the Atlantic as far as Ashánti and Benín. I do not estimate this nation at less than from 6,000,000 to 8,000,000: for the Mandingoes form a very large and numerous race, comprising, first, the Azér, formerly occupying the whole tract of country from Wadán, inclusive, as far as Waláta; the Aswánek or Swanínki (called Sébe by the Fúlbe and Serracolets by the French), principally settled in Bághena and along the upper Senegal; the Bámbara, “Bamanaos,” at present the most powerful section of the whole race, but of ignoble origin, probably originating in an intermixture with the Tombo, and of less capacity and development than many of the other sections of this tribe; those of Bondu, a petty kingdom to the south of the Senegal; the inhabitants of Kaarta; Bambúk, another kingdom; the Júli or Dhiúli on the upper Niger, and its eastern branches in Miniana Wassulo, trading principally in the white Kolanut; the Wangara, properly so called, that is to say, the inhabitants of that zone of Mandingo states which stretches from the seats of the Júli eastwards to Bargu, through Kong and Sansame Mangho, districts very important for industry and the trade in gold; the Súsú, formerly settled more to the north, and very powerful, at present greatly weakened and settled along the Scarries about the town of Kambía, where they have recently received a severe chastisement at the hands of the English; the Krú or Kroo, so important for the navigation along those shores. The Timmáni do not belong fully to this group, but have lately been shown to have some affinity with the Kafirs.

*Fúlbe.*—Next to the Mandingoes or Wangara I mention the very remarkable tribe of the *Fúlbe*, called Fula on the coast near Sierra Leone, Féllani by the Hausa people, Telláta by the Kanúri, and Fullán by the Arabs. The question as to the origin of this tribe is very difficult. Fúlbe families are even settled in Tawát, whether from origin or in consequence of the pilgrimage of one of



the mighty kings of the fourteenth or sixteenth century I do not know. They were settled from ancient times on the middle course of the Senegal, and are mentioned here in the beginning of the sixteenth century, not by Leo, but by De Barros and by the author of the history of Songhay.\* They began to assume great historical importance and to extend their conquests over the neighbouring countries eastward with the ruin of the kingdom of Songhay; but as peaceable settlers they appear even as far east as Bagirim as early as the beginning of the sixteenth century. Their great political rising in the beginning of this century dates from the year 1803. They thus conquered all the Hausa states and pushed on far southward beyond the Benuwí, carrying Islamism and Mohamedan civilization towards the Equator.

The Fúlbe evince great intelligence, but do not exhibit much industry or disposition for trading, and in all their proceedings a want of strong political organization is remarkable. From origin they were inclined to nomadic habits as cattle-breeders, and have absorbed several other tribes, such as the Sissílbe or Syllebawa, and the Zoghorán or Zoromáwa—the latter being more industrial and inclined to trading.† On account of this intermixture, the greatest diversity of type and colour is observable among the Fúlbe. I estimate the whole of this tribe at about the same number as the Mandingoes; but, although the territories over which they extend are by far more vast, yet they are not so thickly scattered. Thus along the whole line, from the Upper Niger to Say, only a long thin thread of isolated settlements stretches out. On the contrary, in Kebbi, Fúta Tóro, Bondu, Fúta Jáló, Másina, Háusa, and in Adamawa, a denser Pullo population is found. For Englishmen, in their endeavours to open communication along the Niger, this race is of the very highest importance; but it is very difficult to deal with, not only on account of the puritanic character of their creed, but also on account of their want of strong government and a durable political organization.

The *Jolof*, although distinguished from the greater part of the Fúlbe by their dark black colour, as settled in the delta of the Senegal and Gambia, are only a different section of the same stock. The languages of those two tribes show affinity, and the same *castes* of degraded classes are observable. The *Jolof* are of beautiful physical development, but are fixed to the soil, show no enterprise, and have never become of any great historical importance, although at the beginning of the sixteenth century they were not quite powerless.

*The Songhay (Leo's Sungai).*—The Songhay are an interesting race on account of their great historical importance in the latter

\* See my 'Travels and Discoveries,' vol. iv. p. 602.

† *Ib.*, vol. iv. pp. 146-175.

part of the fifteenth and the whole of the sixteenth century, and on account of their seats occupying the whole course of the Niger from below Say to far beyond Timbúktu. The Songhay appear to have entertained connexion with Egypt from ancient times, and have thence received Islám and a certain degree of civilization; but they have since decayed and become much degraded, so that at the present moment they are of no significance whatever. However, a few independent communities preserve still a considerable amount of energy. The Songhay language, miscalled Kissour by Caillié, is very poor and not developed, and shows scarcely any affinity to surrounding languages. Nevertheless the territory of that idiom still extends as far as A'gades. However, in general the dominion of this race is not vast, being limited mostly to the valley of the river, although originally Arawán and the whole of the district of A'zawád were inhabited by Songhay. The population in the upper course of the Niger above Timbúktu is still tolerably dense, but in its lower course it is decimated by war, and the whole number of the Songhay may not exceed 2,000,000.

East on the Songhay border the *Haúsa* people. This nation is of very great importance for the whole of North Central Africa; but, according to their language and complexion, they are an intermediate race between the Berbers and Negroes. The *Haúsa* are full of intelligence, liveliness, and of cheerful social disposition, very industrious, and of the greatest importance for Europeans in their endeavour to open Central Africa for legitimate commerce; but they show no strong political organization, and have never been able to form a strong kingdom of their own. In former times they fell an easy prey to the kings of Songhay, Bórnú, or Korórrofa, and more recently were almost entirely subdued by the Fúlbe. Only small remains of national independence are to be met with at the present day in Góber, Marádi, and Zanzara; but the struggle between the original inhabitants of those districts and the conquering tribe of the Fúlbe is constantly going on. The *Haúsa* language is the most beautiful, sonorous, rich, and lively, of all the languages of Negroland; but it is defective in the verbal tenses.

The *Kanúri*, or Bórnú, are a remarkable race of vast historical importance, of a dominating disposition, not very enterprising nor commercial, but of a steady character, and thus well fitted for their central position. They are not so capable of adopting foreign elements as the *Haúsa* race. Their language is allied in grammar to the Mongolian languages, and is very rich in grammatical forms. The *Kanúri* race is greatly deteriorated by intermixture with Slaves and other tribes. The original *Kanúri* race are much finer people, of taller and more slender growth, lips less thick, nose less flattened. Real *Kanúri*, including the *Manga*,

there may be from 3,000,000 to 4,000,000 ; but the Bórnú kingdom comprises a great many different races, such as the Kótoko and the industrious inhabitants of the southern borders of the Chád, the Bedde, Marghi, and many others.

I here next will mention the race of the *Tebu*, or rather *Tedá*, on account of their intimate relationship with the Kanúri, but who, owing to the character of their seats, scattered as they are over an immense expanse of desert, have preserved their original condition. The *Tedá*—*Te-dá*—I have no doubt are identical with the *Ber-doa* of Leo, the *Lúbim* of Scripture, and the *Rubi* of the Egyptian monuments. The seats of the *Tebu* correspond to those of the Berbers or *Tawáreck* in the western half of the desert; but the *Tebu* are of far less importance than the Berbers. Only the *Zogháwa*, that section of this tribe nearest to Nubia and Dongola, made an attempt in the thirteenth century to found a kingdom of their own; but they soon became dependent on Kanem, and afterwards on the kingdom of Fittri, or, as Leo calls it, *Gaoga*. The *Tebu* are divided into a great many fractions and tribes, without any connexion with each other (see vol. iii., Appendix, p. 494). They are scattered over the whole eastern half of the desert, inclosed between the Nile on the east side, *Dár Fúr*, *Wadáí*, and Kanem towards the south, the road by *Bilna* towards the west, and *Kebábo*, or *Kúffara*, towards the north, and are greatly addicted to desultory warfare and to forays. Only that section of the *Tebu* which is settled in the *Wádi Kawár*, between *Fezzán* and *Bórnú*, is of some importance for the commerce of the *Bilna*-road; but they are not even able to dominate this commercial high road and to secure it against the predatory incursions of the *Tawáreck*. The whole number of the *Tebu* probably does not exceed 1,000,000.

I now retrace my steps westwards and first say a word about the *Yóruba-Núfe* nations, settled in a most important position on both sides of the lower course of the Niger, and of great importance as well on account of their geographical position as with regard to their industrial character and their aptitude for commercial pursuits, although their political as well as their social well-being has suffered a great deal from the conquests and the encroachments of the *Fúlbe*.

The *Núfe* have excelled in industry from very remote times, and rival the inhabitants of Kanó in the arts of weaving and dyeing, while the *Yóruba* people, especially on account of their situation between the swampy and unhealthy delta of the Niger and the shore of the bight of Biafra, are of the greatest importance to Europeans in their endeavour to open intercourse along the river. The work begun by the missionaries has been successfully pursued by Dr. Baikie's party. Rev. — Crowther himself is a noble

specimen of the degree of intellectual development of which the Yóruha race is capable. With regard to the amount of population, the Núfe perhaps may number 1,500,000, the Yóruha 2,000,000 to 3,000,000 inclusive of those that have become subjected to the Fúlbe.

West of Yóruha are the kingdoms of Dahóme and Asanti, or Asbánti, with their homogeneous races, both of considerable temporary importance, but, as it appears, of very little value for the future well-being of the whole interior. Moreover, the power of Dahóme is fast crumbling to ruin, and Forbes and Duncan estimate the population of Dahóme Proper at not more than 200,000. The king of Dahóme is perhaps the most despotic king in the world, and the Dahomians real barbarians. The Ashánti, who belong to a larger group of people constituting the O'chi race, seem to unite the greatest contrasts—the utmost barbarity with a certain degree of intelligence and human superiority. The population of Asanti and the tributary provinces may amount to about 3,000,000.

Between the Asanti, the country of the Wangaráwa, and the Songhay there is a group of races comprising, besides some smaller fractions, the larger tribes of the *Tombo*, *Mósi*, and *Gurma*. Of these tribes the *Mósi* are of paramount importance, having been from very ancient times the champions of Paganism against Islamism, and besides their warlike disposition, being remarkable for a considerable commercial activity with regard to the trade of the interior, the people of Yádega providing the markets of Sofára and Jinni, and those of Bússumo those in Libtáko. In the latter half of the fifteenth and in the sixteenth century the Tombo were not less powerful than the inhabitants of Mósi.\*

The Mósi market, *Kulféla*, is of high renown and of great importance: it is constantly visited by Háúsa traders. The Portuguese opened communication with the king of Mósi, and although at the present time the power of the nominal liege lord of the whole country, who resides in Woghodoghó, is very small, yet some of the residences of the most powerful chiefs seem to be well adapted for missionary stations, if the Christian nations wish to put a stop to the progress of Islamism in those regions.

I now again turn eastward, and passing over the little industrious and clever community of *Logón*, or *Lóggone*, who originally formed merely a portion of the large tribe of Mása, I come to the *Bagirma*, or inhabitants of Bagirmi, a race distinguished by their fine type and their warlike disposition, and not at all devoid of industrial

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\* In the chronological tables affixed to the fourth volume of my 'Travels,' p. 595, to the date of the year 1488, after the first mention of the name Mósi that of Tombo is to be added; and, farther on, the name Tombo has to be substituted for that of Mosi.

habits, but bloodthirsty and cruel. This was the origin of much civil war, which prostrated the country and laid it at the mercy of the more powerful kingdoms—Wádāi on the one side and Bórnu on the other.

*Wádāi*, a powerful kingdom, but the different elements of which are as yet not well digested: the ruling tribe the Mába. But the kingdom comprises a great diversity of tribes, besides which a very numerous Arab population has immigrated from the east. However, the situation of Wádāi is not at all favourable for commercial purposes, although in Leo's time there was considerable trade from Fittri to Nubia, and the soil of the northern provinces is dry, stony, and not very fertile. To the south there are several shallow watercourses. The population of the whole kingdom may amount to about 5,000,000; but it does not contain any large towns.

*Fúr*, or *Dár-Fúr*.—People clever, capable of political organization; but the state of society is effeminate. The character of the country is something like an oasis, comprising isolated plantations. There is considerable trade; but the neighbourhood of the Turkish dominions is a great drawback, and the commercial high-road to Egypt and Siút is often shut. The allegiance of the southern provinces is very precarious, while Fúr Proper probably does not contain more than 1,000,000 inhabitants, and perhaps much less.

I will not speak about the Turkish dominions, including Korodán, nor about the various states of Abyssinia. There is scarcely any connexion of Abyssinia with the rest of Negroland.

I will only say a word about the *Pagan nations* to the south, the whole region of which the Wádāi people call *Jenakhéra*, the Fúráwi *Fertít*. In general these pagan tribes do not constitute any very powerful communities; but there are a few exceptions of large pagan kingdoms to the north of the Equator, such as Banda or Dár Banda to the south of Wádāi, Andoma to the south-east of Bagirmi; for these seem to be the strongest. The Fúlbe have broken up the kingdom of the *Batta* in A'damáwa, which in former times was of some importance. The Batta are even now greatly distinguished for their intelligence and their industrial pursuits, as well as their fine bodily development, and they are of great importance on account of their position near the confluence of the Bénúwé and Fáro.

I shall now make a few general remarks about the density of population and population in general.

III. *Population*.—It is easily understood that an exact statistical account of the population of these regions is as yet impossible and quite out of the question. In general the population is far more dense than it is at present found in Morocco or Algeria, and we may establish the following rule, namely, that the Pagan countries and the strong Mahomedan kingdoms are very popu-

lous; but that, on the contrary, the border regions between different dominions, especially between Mohammedan and Pagan states, are more or less depopulated, and in consequence covered with dense forest.

The most populous districts which I visited in the Mohammedan countries are:—

The territory of Kanó, the country of Kebbi between Sókoto and the Niger; and among the Pagan countries, the territory of Músgu, although depopulated by continual forays. Besides, according to the information which I collected in Timbúktu, there is a very densely inhabited tract along the banks of the Niger, between Timbúktu and Jinni.

In the whole of this region polygamy prevails as well among the Mohammedans as among the pagans.

Among the Músgu, whose numbers are constantly decimated by war, scarcely a single head of a family is found with less than five wives.

In Haúsa and Bórnú, the common men have often two wives, but rarely more.

The Fúlbe of Hamdaalláhi, besides their other reforming tendencies, wanted to restrict the number of wives, and to substitute for the permitted tessarogamy of Islamism bigamy.

The Tawárek in general have only one wife, and the same principle prevails in most of the Moorish tribes.

Numerous families are only seen with very rich and wealthy people, one and the same woman very rarely bearing more than four children; but, with princes, families of one hundred children and above are nothing uncommon.

The advantage of this state of society is that there are no spinsters, every woman being useful in a household on one account or other. The drain upon the population by war and slavery is very great. Epidemic diseases on the contrary are very rare.

*Commercial importance.*—Such an importance is either based on the great fertility of the soil, or on the favourable position on a great navigable river, or on a commercial high-road, or again on the industrial capacity of the inhabitants, or at length, where all these three causes are united. These conditions, however, may exist, but there may be wanting a strong government, such as is necessary for commercial intercourse. Within the limits of Negroland itself we find, for the first time, all these requisites united in the upper course of the Niger; for here we find not only the two principal conditions of African commerce, which in the beginning of trade formed the two chief staple commodities of exchange, viz., gold and salt; but besides, we meet also with that most essential article for civilized life, clothing; and already in the eleventh century we see that the inhabitants of Sama were

celebrated for their calico, or rather their strips of cotton, and it is very remarkable that this article bore at that time the same name which at the present day is given to European calico, viz., shigge. In the course of time, at the beginning of the sixteenth century, we find this same industry transplanted farther eastward to Zánfara, while the inhabitants of Góber, at the same time, were famous on account of their leather work and their shoes, and, together with the art of weaving, that of dyeing, which especially imparts a tint of a certain civilization to many African communities, was soon developed, the indigo plant being indigenous to the tropical regions of Africa.

At the present time we find most of these requisites united in the most favourable manner in Háusa, especially in the province of Kanó, and I need not repeat here the terms of admiration which the high degree of development, in the commercial entrepôt of the chief place of that province, has wrested from me in another place.

Nyffi has been from ancient times celebrated for industry, but since the rising of the Fúlbe has been greatly reduced by civil war.

The whole course of the Niger, with its eastern affluent the Bénúwé, is of the greatest importance, especially about the confluence of the two principal branches, and in the upper course between Timbúktu and Sansándi.

In this latter district certainly the native commerce is greatly developed; but the middle course of the river, between Timbúktu and Sinder, about 80 miles north-west of Say, has very little commerce and intercourse at the present time.

Thus likewise the whole country between Háusa and Timbúktu is in a very disturbed state. The consequence is, that the merchandise which is exported from Kanó to Timbúktu takes the roundabout way by Ghát, Ghadámis, and Tawát.

The country near the mouth of the Niger is especially important for the palm-oil trade, the value of which at present amounts to more than two millions; but this palm is not to be found at a greater distance from the coast.

It is remarkable that this part of Africa, which has been endowed by nature with almost the same natural wealth as India, should have remained so poor, while the former country has developed such an immense amount of wealth.

The most ancient commercial entrepôt in these regions was Aúdaghast, which, in the tenth century, carried on an extensive commerce with Sigilmása or Sijilméssa, at a time when the western part of Barbary was most flourishing. At a later period, when Tunis and the commerce with Egypt were more flourishing, the trade settled rather in the north-eastern corner of the Niger in Gógó or Gáglo, the capital of Songhay, and in Tademekkas,

the former being mentioned as a commercial place as early as the latter half of the tenth century. And the route to this part of the Niger, from Egypt by way of Aújila, probably was pursued from very ancient times—this being the route which, according to the indications of direction given by Herodotus,\* was followed by the ancient Nasamones.

Gógó, on the Niger, between Timbúktu and Say, was the most flourishing place of Negroland for at least six centuries.

Tademékka was supplanted by Agades in the sixteenth century ; but Agades only remained flourishing as long as Gógó was a large commercial place, and began to decline from the moment that the capital of Songhay lost its independence. Afterwards Kebbi, Zánfara, and Kanó flourished for some time, and it was not till about forty years ago that Kanó became a great commercial entrepôt.

Farther westward Waláta or Bíru was a considerable commercial place, till it was conquered by the Songhay King Sonni Ali, when the greater part of the merchants resident there transmigrated to Timbúktu, but notwithstanding Waláta was still important in Leo's time.

All these commercial places were supplied from the north, but a great change was brought about in the commerce of these regions when the Portuguese, in their enterprising career, appeared on the western coast of Africa about the middle of the fifteenth century, and applied themselves with the greatest energy in opening a peaceable intercourse with the interior. That was the reason why one of the great commercial routes at that time took the roundabout way by Wadán.

The Portuguese even established in the latter place, at such a distance from the coast, a factory, although they preserved it only for a short time. They then entered the Senegal, and pushing continually on along the coast, founded their principal colony. El Mina, on the Gold Coast. From this very spot they sent one of their famous embassies, of which we have received information, into the interior, to Músa, King of Songhay.† But it does not seem as if the Portuguese succeeded in opening a steady commercial intercourse with the interior. And certainly the circumstance, that the interior regions in this part of Western Africa are hemmed in by a considerable chain of mountains, is not favourable for commerce on a large scale, although in other respects the road from the Gold Coast appears to be one of the most accessible. But in general the roads are very difficult, and can only be pursued by people on foot.

This is the reason why the European settlements on the coast

\* See my 'Travels,' vol. v. p. 193.

† 'Travels,' vol. iv. p. 595.



never became of any great importance, except those on the Senegal and Gambia. And in this respect settlements made in favourable and healthy localities, on the Niger, and on its great eastern branch the Bénuéré, would necessarily become of paramount importance. For there is no doubt that, for an extensive European commerce, the various caravan roads through the desert are far too expensive and dangerous in the present unsettled state of these countries, and the value exported and imported along these highroads has of late greatly decreased. But from whatever quarter Europeans may endeavour to open intercourse and regular and legitimate trade with these nations, the first requisite seems to be the strictest justice and the most straightforward conduct; for almost all the natives of the interior of Africa are traders by disposition; and the naked pagans themselves at least want to barter for beads, in order to adorn their own persons and those of their women.

There is no doubt that if Europeans go on in such a way a great amount of commerce will here develop itself, and that one or other of the native kingdoms will rise again to great power and strength, such as we see exhibited in former times. For the existence of powerful kingdoms is eminently necessary for the development of legitimate trade in regions torn by almost continual warfare.

*Religion.*—The original worship of nearly all the African tribes was a worship of elements, especially the sun, moon, and fire, besides the worship of the souls of their ancestors, which seems to be common to almost all the African tribes. And it seems as if originally the forms of worship had been less savage and absurd than they are at the present time. Thus the religious rites of the tribes in the interior in general are by far purer than those near the coast.

Most of the pagan tribes in the interior with whom I came in contact, and about whom I gathered information, have not such a developed priesthood, nor such an influential class of sorcerers, as is the case with the tribes near the coast.

We have seen already that it was the Berbers who first brought Islam to Negroland. These were especially the Zenágha or Idawel-Haj, led on by Abu-Bakr-ben-Omar, who died in the year 480 of the Hejra. Thence, from the upper course of the Niger, about Zágha and Silla, the town visited by Mungo Park, Islamism spread over the neighbouring countries. But also on the north-eastern bend of the Niger, where the great river of western Negroland approaches nearest to Egypt, we find, as early as the beginning of the eleventh century, the Mohammedan religion an essential requisite of royalty with the ruler of the kingdom of Songhay; and about the same period, in the latter half of the

eleventh century, we find the Mohammedan religion also adopted by the royal family of Bórnú. For everywhere civilization and Islám migrate together hand in hand with commerce, and the sixteenth century, which was the period of the prime of the kingdom of Songhay as well as of that of Bórnú, was also the time when Mohammedan learning flourished most on the Niger as well as on the Komádugu near Birni.

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X.—*Killimandjaro and the White Nile.* By JAMES MACQUEEN, Esq., F.R.G.S.

*Read, May 9, 1859.*

MOST unreasonable doubts have been raised and propagated regarding the mountain called Killimandjaro, in Eastern Africa, rising above the limits of eternal snow. Other idle speculations bring the parent stream of the White Nile from that great mountain. It is, however, as certain that Killimandjaro is largely capped with snow, as it is that the sources of the Bahr el Abiad or White Nile lie at a considerable distance from the former, and can have no connection with it. Unquestionable authorities establish these important points.

Mr. Rebmann performed three journeys from Rabbai Impey, near Mombas, into the interior. The first journey, in 1848, he reached the Bura or Taita range of hills, rising, as he states, from 4000 to 6000 feet above the level of the sea. The Bura mountains are seven days' journey from Rabbai (*Church Missionary Intelligencer*, Oct. 1852, p. 275), and these hills or ranges are three days' journey in breadth. They rise from a waterless plain, abound with springs and streams, and have the finest climate in the world. "I felt," says Mr. Rebmann, "when in that country, as if I walked on the Jura mountains in the canton of Basle, so cool was the air and so beautiful the country. I walked over the hills and dales of Taita, in Eastern Africa, not very distant from the equator, as easy and happy as there; the lofty mountains with their luxuriant vegetation, and the manifold songs of the birds, praised the Creator with myself," &c. (No. 17, Sept. 1856, p. 394.)

The distance from the sea to these hills is about 100 British miles, and their breadth say 20 miles, together 103 geo. miles. The route travelled was about w. by n. From the Kadiaro Point in these hills Mr. Rebmann first saw Killimandjaro and its snowy sunnits, May 11th, 1848. He states that from Bura Taita he took a bearing of Killimandjaro, which was *due* N.W. From Bura he set out, December 6th, 1849, for Madjame; and at

the end of three days and a distance of 80 miles, crossing in their route several rivers, reached Kislema (always ascending). On the 4th of January, 1849, left Kislema, went N.W. 6 or 8 miles (gradually rising), at which point they were about 18 miles distant from the foot of the mountain. Here at night the cold (though under cover) was as great as in Europe in November, being there so near the snow mountain, which he could well distinguish by the dim light of the moon. The spot where he slept could not be more than 5 or 6 miles from the snow. On the 5th of January he continued the journey as before (N.W.), but soon altered the direction to W., which was his course thenceforward till they reached Madjame. The province of Uru, which they entered, affords very little level land, it being greatly intersected by valleys, from 1500 to 2000 feet in depth, through which perennial streams, supplied from the Snow Mountain, found their way. In one day and a half from Kislema to Madjame (at one place in this route he was only from 3 to 4 miles from Killimandjaro) passed several rivers with pretty large volumes of water, they being on an average five inches deep and five yards broad.

From Uru the distance to Mount Killimandjaro was 5 or 6 miles; but this distance is most difficult to pass, from the rugged nature of the country, and may take a day and a half to do it. From Uru he saw Madjame fully, because it lies lower. It extends between the S.W. foot of Killimandjaro and the N.E. foot of Mount Shuru or Shua, which latter, as he saw, was high enough to be sometimes covered with snow.

There are two summits rising to the limits of snow out of the common mountain mass. The eastern is lower, and terminates in several peaks, which during the rainy season are often and very far down covered with snow, but during the day and in the dry season it will sometimes entirely melt away, while at other times a few spots will remain. The western summit is the perpetual snow mountain, which, rising considerably above its neighbour, affords much more room for the snow, it being formed like an immense dome. It is 10 or 12 miles distant from the eastern summit, the intervening space presenting a saddle-like appearance, which, so far as I know, is never covered with snow. About 10 miles to the S. of Uru I saw a lower mountain like the Shuru, separate from the Jagga and mountain mass named Uzuina Na-Masai. It stretches from N. to S., or rather from S.E. to N.W., for about 18 miles. It in fact forms part of a range extending far away to the southward. The natives said that when they put the white matter taken from Killimandjaro into a calabash near a fire it became water, and also that when they attempted to bring a mass of it from the mountain to show the king it became water before they got it down to the village. During a period of two months in this journey Mr.

Rebmann saw Killimandjaro every day whenever the sky was clear. Returning by Uru, he passed within 3 miles of the mountain; and Dr. Krapf, in his repeated journeys to Ukambane, saw it daily, whenever the sky was clear, for months together. It had in its snow-capped dome the appearance of the snow-clad mountains which he saw in January on his way to Laybach and Trieste. Dr. Krapf visited Ukambane twice, in 1849 and again in 1850. The country lies N.W. from Mombas. On his way he passed the small river Woi, which descends from the northern end of the Taita range, and runs N.E. till it joins the Adi; next, the Tzavo (the waters of which were very cold), a more considerable stream, which descends from the eastern side of Killimandjaro; next, the small river Andaku, another tributary to the Adi; and, after a march of 18 miles, they reached and passed the river Adi, which is the S.W. boundary of Ukambane proper. The breadth of the bed of the river was 170 yards; but the water channel there, November 21st, end of dry season, only about 60 feet, and 1 foot deep. This river comes from the west parts of Kikuyu and the snow-clad mountains of Kenia or Kirenia, and is impassable during the rains. Mount Shuru, in their western journey, hid Killimandjaro from their view, and which latter seems to rest upon the former, though the distance between them was very considerable. As little children when compared to a giant, so are the mountains of Taita and others, though 6000 feet high; so, adds Dr. Krapf, is Killimandjaro, as contrasted with them in height.

From the Adi they marched N. by Yata to Kitui, the capital or residence of Kivoi, and always ascending. The cold (December) near Yata was intense. The country of Ukambane is very elevated. The river Dana is 4 days' journey from Kitui; and there, when reached, was (in the dry season) from 150 to 200 yards broad, and 6 or 7 feet deep, and free from obstructions by rocks downwards to the sea. The river Dana comes from the snow-capped Mount Kenia. Dr. Krapf repeatedly saw these snow-clad mountains. The nearest rose like a saddle, with pinnacles on it, like two horns. It bore by compass from Kitui N.W. by W., or say true N.W. Beyond, to the W.N.W., appeared another snow-clad mountain, which seemed of equal height, and, because it was seen at a very small angle, it must have been at a considerable distance from Kenia. Dr. Krapf saw the snow on this mountain when the sky was clear, the distance being 11 or 12 days' journey—at least 120 miles. Several rivers issue from this high land, and run to the eastward. On the N.W. side there was a river called Tumbiri, which was stated to run N., to the country of the white people, and the end of which was not reached after 100 days' journey. This, no doubt, was the White Nile, called Tubiri by Werne, as we shall by-and-by see when we come to examine the authorities about its

source and course of the rivers, taken to the N.W. of these high mountains by the Egyptian expedition and the explorers of that famous stream. Mr. Erhardt says there is a large salt lake, called Barengo, running N.E. from Mount Kenia; and both Dr. Krapf and Rebmann tell us that from a lake called Lukoya, near the N.W. foot of the Mount Killimandjaro, a river flows N.E. to the Adi. All these points considered, and given from such good authority, show not only that the White Nile does not come from Killimandjaro, as some theorists make it, nor from any point to the S. of the equator, as will be further established by other equally clear, if not still clearer authorities. The Pangany river, it may be here remarked, springs from the S.W. base of Killimandjaro, and is augmented by the streams springing from that mountain, and all those rising in and westward from the Taita range.

Dr. Krapf was told at Kitui by an Uimba chief who had been at the foot of Mount Kenia, that the white matter upon it turned into water as it descended from the mountain, that the natives never ascended it on account of the extreme kiria or cold, and also that beyond it to the N.W. was a road leading to Roum, or Turkey in Asia, or the Turkish Empire, called by the Arabs Roun. He also tells us that Uimba is 2 days' journey N. from the river Dana, and that Kenia is the western termination of the Kikuyu mountain-range.

Turning to the White Nile, we have its course correctly delineated by the expedition sent to explore it by Mahomet Ali, the ruler of Egypt, in 1839 and 1840, from Khartoum upwards, through its very winding course, to  $3^{\circ} 30'$  N. lat. and  $31^{\circ}$  E. long. from Greenwich. In every day's progress, the width of the river, the depth of the river, the current of the river, the distance run in miles, and the state of the thermometer, are regularly marked. Its great tributary, the river Seboth, or Red River, which comes in its main streams from Enarea and Kaffa, is clearly marked. Where it joins the Baro,  $9^{\circ}$  N. lat., it is 1100 feet broad, its banks higher and current greater than the Nile. The lake No, or Couir, through which on its E. side the river runs, lies in  $9^{\circ} 16'$  N. lat., and  $29^{\circ}$  E. long. A large river from the W. joins the Nile by this lake. The country is very level all the way to the point where the expedition was, on the 26th January, 1840, stopped for want of water, the river having fallen so much, that the vessels had only from 3 to 6 feet water, the breadth being about 1370 feet. There the bed began to get rocky. The vegetation around had completely changed, and the trees and foliage here were like those of Europe, and continued ranges of hills began to cover the country in every direction, rising to greater and greater height towards the S. Lokono, the king of Bari, told them that the river came from the S.E., its sources being at a distance of one month's journey,

which may be taken at 25 days' actual travelling, and in a great mountain, according to his description vastly overtopping all its neighbours. The stream, he said, was first formed by the union of four small rivers descending from the mountain. Werne, who accompanied the second expedition, received similar information, and that the river, in its early and most southern course, was called the Tubiri, most certainly the Tumbiri of Dr. Krapf. Werne also gives the same distances, and the names of many of the mountain ranges which he saw and heard of, and a description of many of the tribes that dwell among them, and intimating that at a very great distance beyond the mountains where the river rises there were white people, like the crews of the Turkish vessels, which people could only be the Arabs of the E. coast about Brava, Melinda, &c. Werne says he went about 20 miles beyond the point where the rapids existed, when they were compelled to turn back. Dr. Knobelecher states that at Loquek, he found it 650 feet broad, and from 5 to 8 feet deep, in the dry season. The country round Loquek was very beautiful, and the population, generally speaking, a fine race of men, robust and well made. The districts on both banks of the river abound in very fine iron, which the inhabitants manufacture into various articles, useful and ornamental.

The best description of the river above the point mentioned, almost to its sources, is that given by Don Angelo, who visited this quarter in 1852, and during the dry season. His starting position is one degree too far N. I retain the lat.,  $3^{\circ} 30'$ , given by the commander of the Egyptian expedition, though the Frenchmen who accompanied him in his second expedition, in the following year, want to make it out that they reached a higher point in the latter ( $4^{\circ} 40'$ ) than he did in the former. It is considered not worth while to show their error ignorantly or carelessly made, for when we find the long.  $31^{\circ} 18'$  E., certainly the most difficult and delicate point to ascertain, retained by those men, as it was originally given by Selim, it forms proof that both latitude and longitude as given in the first voyage were correct. From  $3^{\circ} 30'$  N. lat.\* and  $31^{\circ} 2'$  E. long. to the point where the source of the main stream is stated, and in fact shown to be, 330 geo. miles, it is obvious that there is abundant space to form a river even much larger than the Bahr el Abiad is found to be. It is possible—nay, it may be taken as certain—that it receives some tributaries from the s.w., though none of these can be very large.

About 20 miles above Loquek the bearing of the river turns nearly 30 miles w.s.w., having in the preceding distance passed a

\* The astronomical observation was made in  $3^{\circ} 30'$  N. lat.: river there 1700 feet broad: but the expedition went about ten geographical miles farther s.; river there 1370 feet broad.

high rock in the middle of the stream. On the n.w. bank dwell the tribe of Oouingara. At the point mentioned is the great cataract of *Garbo*, from whence the river turns its bearing, first to E.S.E. and next to the S.E., upwards, it may be said, to its source. The cataract of *Garbo* is great and impassable, and is in about  $2^{\circ} 40'$  N. lat. About 60 miles beyond this is *Robengo* (capital of *Kuenda*), and one day's journey beyond it is the village of *Lokoya*, where the Nile is joined by a considerable stream, formed by two rivers descending from the E. side of the great mountain of *Kimborate*, 25 miles S.E. Beyond *Lokoya* the Nile or stream is only a small rocky river, springing from a group of elevated mountains, some days' journey, say 3 or 4, beyond the tribe of *Padongo*, to the eastward or south-eastward of *Kimborate*. The different rivers that join the Nile in its early course, and the tribes that dwell around them, are all marked on the map, which renders it unnecessary to particularise them here. About half-way between the cataract of *Garbo* and *Rohenga* the river is so reduced in size, that in the tribe of *Mudas* it is crossed by a bridge formed of a tree thrown across it. The bed of the river is very rocky and the water very shallow in all these parts above *Garbo*. East of the river the whole country is cut by high mountains. Those of the *Imadone* especially are very high, and form part of that chain which separates the *Gallas* from the black races; and they are also remarkable as giving rise to the river *Sabaut* or *Seboth*, and its confluent the *Calhia*. Those rivers run first from N.E. to S.W., and then N. The negroes trade with the *Gallas*, and others among these mountains, in gold-dust. The map will point out fully the range of mountains, and the rivers which descend from *Kaffa Souro* and the *Kenia* range, all running to the south-eastward, and into the Indian Ocean. Beyond the *Padongo* the country is marshy, and there is a river named *Diria* running from W. to E.

Here it may be observed that all the rivers and places to the S. of *Enarea* and *Kaffa*, along the course of the *Malo* or *Great River*, are laid down from specific journeys made and given by Arab and native travellers, as these have been collected by *Bruce*, *Harris*, *Krapf*, *D'Abbadie*, &c. These, therefore, as here delineated, may be assumed as tolerably correct.

From a very early period of history the most attentive writers have uniformly stated that the mountains round the sources of the Nile were covered with perpetual snow. *Ptolemy* states this pointedly. *Bruce* heard that this was the case; so did *Major Harris*; and also that the hills of *Souro* to the S. of *Kaffa*, in about  $3^{\circ}$  to  $4^{\circ}$  N. lat., were always covered with snow. *Krapf* heard this also of the mountains in these parts when he was in *Shoa*; and finally he states that the mountains around the sources

of the White Nile were covered with perpetual snow.\* Why should this excite either doubt or surprise, when we find the hills in Abyssinia, such as Simien, on the N. of Gondar, rising above the limits of snow, and around the sources of the Tacazze, Pearce found the hills covered with hoar-frost every morning, and the cold exceedingly great? The ancients also placed the sources of the Nile about the equator, for we find the priest of the temple of Minerva in Egypt telling Herodotus that one-half of the waters of Africa ran to the S., and the other half to the N. But, though snow-clad hills covered the mountains round the sources of this far-famed stream, only a few simpletons taught that the melting of those snows occasioned the flood or swelling of the Nile. All the snows on them were and are but a drop in the bucket compared to the real cause, namely, the tropical rains, when the sun returns to the northern torrid zone, during which time the snow falls most heavily. We now know well the cause, nor was that cause unknown to the ancient world. In Lucan's 'Pharsalia' we find the venerable priest Achoreus describing, in the beautiful language of Roman poetry and Eastern ideas, to the great and renowned chief Julius Cæsar, the real cause of the flooding of the Nile, namely, the tropical rains from the accumulated clouds collected and condensed near the equator and in the northern torrid zone, as we find is really the case. Julius Cæsar was so anxious to learn the position of the sources and phenomena of the Nile, that he said to gain that knowledge he would relinquish the civil war. He sat with Achoreus a whole night in Alexandria discussing these points, while the venerable priest pointedly told him that the flood of the Nile proceeded neither from the softened cold of Boreas nor dissolving snow, but from heavy rains only. The whole passage in Lucan (book x.) is beautiful and instructive, and well worth the perusal. Take the following:—

————— "Spes sit mihi certa videndi  
Niliacos fontes; bellum civile relinquam.  
Finierat, contraque sacer sic orsus Achoreus:  
Fas mihi, magnorum, Cæsar," &c.  
"Vana fides veterum, Nilo, quo crescat in arva,  
Æthiopum prodesse nives. Non Arctos in illis

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\* A few years ago a Captain Short, in the naval service of the Imaum of Muscat, informed me that he went up the river Jub 210 miles, and at the point reached he saw in the distance to the W. a long line of a snow-clad mountain range running apparently from S. by W. to N. by E. His distance to the nearest point of this range is about 260 miles. Now the chain of mountains in question cannot be less than 20,000 feet high, if not more. The elevation of 5000 feet gives a view to the extent of 84 miles, consequently 20,000 feet will afford a scope of 316 miles; so that Short could readily see the range he mentions from the point on the Jub which he reached. In his account we have a remarkable and satisfactory proof of the accuracy of the previous information which told us that great mountains covered with perpetual snow stood in that quarter of Africa.



Montibus aut Boreas. Testis tibi sole perusti  
 Ipse color populi, calidique vaporibus Austri.  
 Adde, quod omne caput fluvii, quodcumque soluta  
 Præcipitat glacies, ingresso vere tumescit  
 Prima tæbe nivis: Nilus neque suscitât undas  
 Ante Canis radios, nec ripis adligat amnem  
 Ante parem nocti, Libra sub iudice Phœbum."

It is a singular and a most unaccountable thing how Ptolemy should have committed such gross errors in his latitudes in southern central Africa, while in the more northern parts of Africa within the torrid zone we find him not materially wrong, and that in his longitude we find him to be remarkably correct. Thus Alexandria he places in  $60^{\circ} 30'$  E. long., and Lake Coloe or Tzana  $69^{\circ}$ —a difference of  $7^{\circ} 30'$ . Now Alexandria, according to our reckoning, is in  $29^{\circ} 51' 28''$  E. long., and the centre of Lake Tzana in  $37^{\circ} 20'$  E. long.—a difference of  $7^{\circ} 28' 32''$ . In like manner he places the eastern branch of the White Nile in  $65^{\circ}$  E. long., making a difference of  $4^{\circ}$  between it and Lake Coloe. Now, deducting  $4^{\circ}$  from  $37^{\circ} 20'$ , we have  $33^{\circ} 20'$  as the position of the eastern branch of the White Nile; coming again, as Ptolemy tells us, very near to what is probably the truth. The source of the E. branch we find from Ptolemy to be  $4^{\circ} 30'$  E. of Alexandria; and if we add  $4^{\circ} 30'$  to  $29^{\circ} 52'$ , we shall have the source of this branch in  $34^{\circ} 22'$  E. long., near the point where it really is. Again, we have the Lake Couir or No nearly in the meridian of Alexandria, as Ptolemy has placed it. In the Latin text the longitude of this lake is  $60^{\circ} 30'$ , or  $29^{\circ} 15'$  W. of Alexandria—the difference only  $15'$ . It is needless to follow such comparisons further.

In reference to the term "Mountains of the Moon," it is of no consequence what that name is intended to convey; sufficient for our purpose in these latter days is to show that immense high mountains covered with perpetual snow do stand round the head of the White Nile. In reference further to the position where Ptolemy has placed them, namely,  $12^{\circ}$  S. lat., and his eastern lake in  $7^{\circ}$  S. lat., it would almost appear that, by some greatly erroneous information, he had got hold of the high lands to the S. of the lake called N'Yassa, the lake being much farther N.; and thus that lake will be his eastern lake, and Lake Ujji or Taganyenka is his western lake, or western source of the western branch of the Nile, about  $8^{\circ}$  separate, and his lake at the junction of the two streams,  $5^{\circ}$  farther N. than his first lake, is in  $2^{\circ}$  S. lat., where we are told there is a lake; and thus we have his errors and his features of Africa in this portion of that continent made out. Wherever ancient geographers found a lake, they were sure to carry a river out of it; and if they found another lake in the course they gave this river, they were sure to carry this river to it and from it. In this respect many moderns followed their example.

It requires only an inspection of the accompanying map to show any inquirer or observer, not only the true sources of the Nile, especially of the White Nile, and that these cannot be to the s. of the equator, nor have any connection with Killimandjaro, nor the rivers in Kaffa and Enarea, which, with the exception of the more remote sources of the Seboth river, all run s.e. into the Indian Ocean.

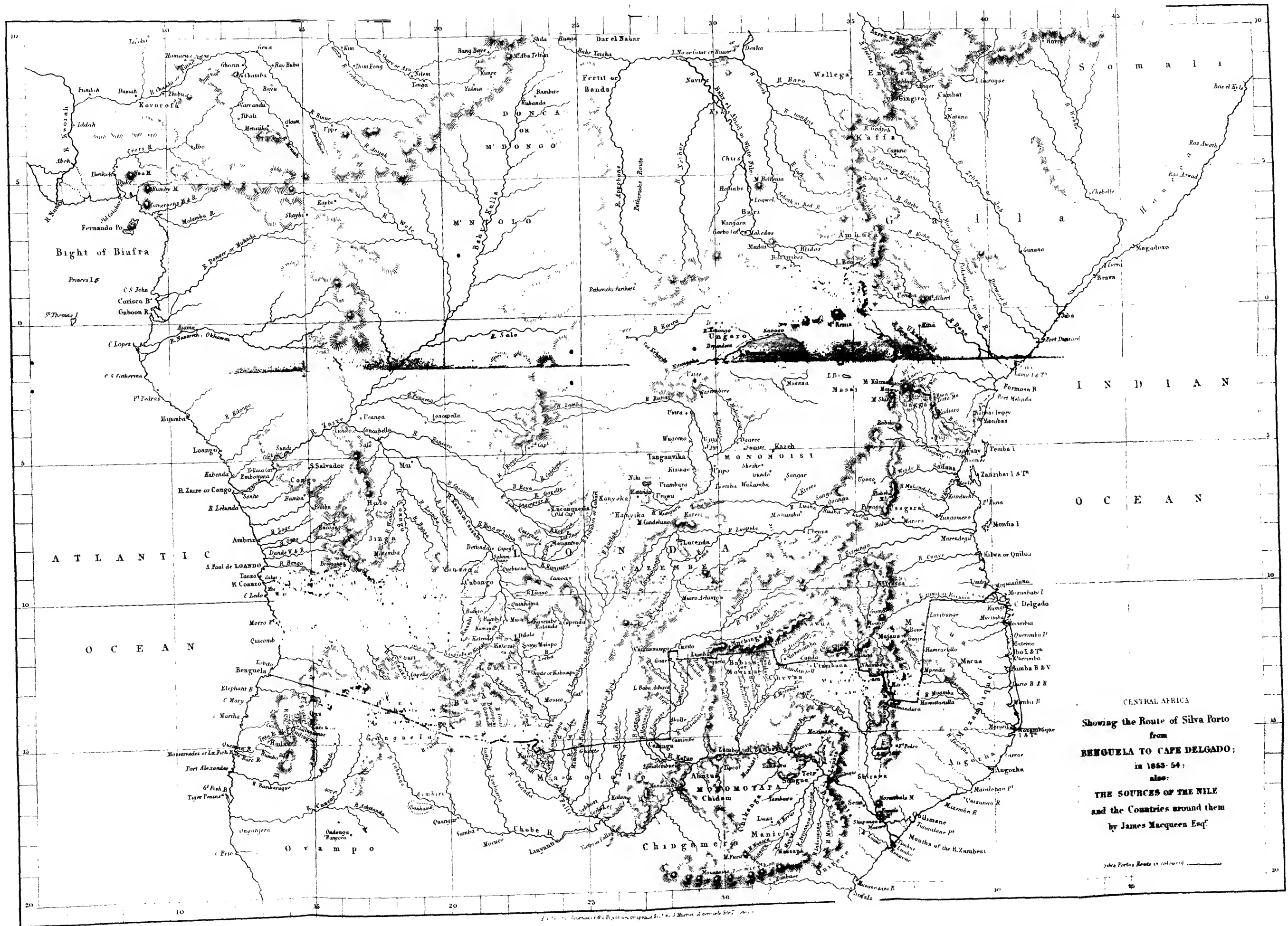
Some very curious and important information connected with the countries near the sources of the Nile has just been received from a French missionary (R. P. Leon), dated at Zanzibar, August, 1858. This missionary had been in Enarea. He states that there is a frequented road from Brava on the sea-coast to Kaffa, the journey occupying 24 days. This, by native estimation, is about 15 miles daily; but they never actually travel more than 10 miles on an average. The estimated distance is 360 geo. miles, which is tolerably accurate. Twelve days' journey s. of Kaffa, he states, dwell a people called Amara, nearly, or it may be said, white. They have written books, and a language different from either the Ethiopic or Arabic. They build houses and villages, and cultivate the ground. They are rightly conjectured to be the remains of Christian nations, which in early times spread far to the s. of Abyssinia, till they were overrun, massacred, or scattered by the savage Galla. It has been repeatedly asserted that such remnants of Eastern Christian churches were scattered over this portion of Africa. Four days' journey from the Amara Mr. Leon says there is a lake from which an affluent of the White Nile is seen to flow. Mr. Leon supposes this to be the source of the Seboth, but it is more probable that it is the main stream of the Nile.

The Amara, he says, dwell between  $2^{\circ}$  and  $3^{\circ}$  n. lat., and have some tribes of copper-coloured people, who dwell near the equator, subject to them. No Mussulman can venture to enter this country.

XI.—*Journeys of Silva Porto with the Arabs from Benguela to Ibo and Mozambique through Africa.* Nov. 26th, 1852, to January 22nd, 1853, and from June 9th, 1853, to August, 1854. By JAMES MACQUEEN, Esq., F.R.G.S.

*Read, June 27, 1859.*

THIS Portuguese trader has, it appears from his own account, made more than one journey from Benguela into the interior—one to Cutonge, and another to a very considerable distance beyond it to the eastward. In his third and most important journey he was accompanied by some Arabs, who had come from the Zanzibar



CENTRAL AFRICA  
Showing the Route of Silva Porto  
from  
BENGUELA TO CAPE DELGADO;  
in 1853-54;  
also:  
THE SOURCES OF THE NILE  
and the Countries around them  
by James Macqueen Esq.

Silva Porto's Route as indicated by a line



and the east coast, to Benguela in the Atlantic. With these Arabs he set out from Benguela on the 9th June, 1853, and reached Cutonge at the end of 105 days, about the 21st September. On the 22nd of that month the company under his charge left Cutonge, and, crossing the continent to Ibo, on the east coast, they thence proceeded to Mozambique, which they reached on the 12th November of the following year (1854).

The portion of the journey from Bihe, in 1852, is here properly first considered. Cutonge, mentioned by Silva Porto, and where he had a trading station, is doubtless the Kutongo of Dr. Livingstone, and thus its true position is distinctly and correctly ascertained. At this place Dr. Livingstone tells us a Portuguese trader from the west coast had a trading factory at the time he first went up a portion of the Leeambaye. Boa Vista seems to be the capital of Bihe, for it is here that an accredited Portuguese agent from Loando resides, though Coquema also seems to be similarly situated. It is but one day's journey distant from the former place to the southward.

Silva Porto started from Boa Vista on the 26th November, 1852. In this, and in his other journeys, he was supplied with a considerable quantity of goods by his government for presents to the different chiefs that lay in his way. At the end of the first day's journey he reached the River Coquema (a tributary to the Coanza) near its source. Keeping near it, he crossed it on the second day, 64 feet broad. It was then near the end of the dry season. The direction of his journey was east. He crossed the Coanza at a distance of two days' journey from its source. At the point where he crossed it was 4 fathoms (24 feet) broad, but deep. In his way from the Coquema, he crossed first the River Cunde, 30 fathoms broad; next the Quisulongo, 3 fathoms broad,—both affluents of the Coquema; and lastly the Cutupe, 5 fathoms broad, and an affluent of the Coanza. On the left bank of the Cutupe and a little to the north-east of his route, is the capital of the state of Quiengo, one of the most considerable states in these parts, as it stretches north-eastward to a considerable distance beyond the Coanza.

Soon after crossing the Coanza the river Hicabere is crossed, 12 feet broad; next the Lumbuambua, 18 feet broad. Both these rivers are affluents of the Coanza, and come from the east, or rather south-east. The latter river forms a considerable lake in the midst, at that time thickly covered with beautiful aquatic plants and flowers, which gave forth a most delicious perfume. At the end of two days' journey from the Coanza Silva Porto crossed the waterparting, and came upon the head of the river Cubulai, which bends its course eastward, 18 feet broad where crossed, and joined by the river Munhona, from the westward, 18 feet broad

where crossed. The united streams join the river Cuito de Zam-bueria near the capital of the chief Accumco. The prospect near the junction of the rivers is exceedingly picturesque. Four great and high mountains appear at some distance to the northward, apparently about  $1\frac{1}{2}$  mile distant from each other, and one other equally high at a greater distance, but isolated from the others. Through the former mountains descends the river Cuito, which where crossed was 72 feet broad, and so deep as to require canoes. The country westward is studded with gently rising ridges. On the west side of the Coanza the features of the land are the same. Brushwood is in many places abundant and troublesome. In some places trees are found, but in other parts there are none. The country is everywhere intersected with rivulets, and is also fertile and productive. The river Coquema separates the state of the Biheans from the Ganguellas, a people who, as we shall presently see, hold a great extent of country to the eastward.

The river Cuito joins to the southward the great river Cubango, which rises in Nanno, to the westward of Bihe, and, flowing south-eastward, is certainly the parent stream of the Chobe, a large affluent of the Leambaye or Riambeje. Pursuing his course east, for nearly three days, Silva Porto next turned during two days nearly south, passing in this distance the river Loaputo, 12 feet broad; the Muzire; the Coandere, 72 feet broad; the Chaumette, 12 feet; and next the Cuenti. All these streams are tributaries to the Cuito. Renewing his easterly course, Silva Porto, in the course of five or six days' journey, crossed the river Lupire, 24 feet broad; the Cumsha, 24 feet broad; the Coue, 18 feet broad; and next reached the junction of the river Caimbo, 42 feet broad, with the river Cuanda (Quando), 48 feet broad, the rivers, when united, forming a stream 90 feet broad; the three first rivers are affluents of the Cuanda, which is again joined by the river Cuti, 24 feet broad, and their united streams run to the river Riambeje or Leambaye. Most of these rivers are deep, though none require canoes to cross them. The country is generally plain and fertile, but about the river Caimbo the country is so thickly covered with close brushwood that it is almost uninhabited. Honey is very abundant in this part as well as in other places. On the right bank of the Caimbo is the country of Buamungo, governed by Soba Caleda, a chief of considerable importance. Next to this is the small place called Mueza. The river Cute terminates the people called Ganguellas, and who, in these parts, are terribly annoyed by the fierce tribes of Ganguellas of the north called Cangela, Canga, and Quitembo.

The united streams of the Caimbo, Cuanda, and Cuti, are most probably the river called Longa by Dr. Livingstone. The chief of the country of Cute, so called after the river, is subordinate to a soba or chief residing at Mueze: Mutembe, or rather Mutimbe, who

is the sovereign of the whole district. Continuing his course east from the Cuti, Silva Porto reached the banks of the river Nenda, having passed in his way during a journey of three days two small rivers, the Hiculai and Halenga, affluents certainly of the Leambaye. These again are probably affluents of the Kama of Livingstone. At this part of his journey the narrative that has come into my hands breaks off abruptly, but there can be no doubt that he was then close upon the Leambaye, and probably the river Nenda was the western branch of that river where it forms the island of the Barotze valley. In his subsequent and most important journey he goes into no detail of his journey from Benguela to Bihe, considering, no doubt, that he had already made that portion of Africa sufficiently well known, but, as we shall see presently, he starts at once from Cutongé in his journey to the east coast. The country of Cuti formerly formed part of the state of Luy, but the Maccacottos (Makollolos, Livingstone) have thrown off the yoke, and got possession of part of it on both sides of the Leambaye. It must be observed that this journey of Silva Porto's was undertaken in the midst of, and towards the close of, the dry season, which accounts for the state of the rivers which he passed being so low; but he tells us that, in the rains, they inundate the whole country, especially in the country of Cuti, where the houses of the population are raised a considerable height above the ground to preserve them from the floods, as also places raised in the same manner in order to preserve their provisions and food from the effects of the great damp that prevails during the rains. Still the floods are at times so violent that both houses and people are swept away. An inspection of the map will show that there is a large and sufficient distance from the route delineated that was taken by Graça to the Cassabe to give room sufficient to produce very large rivers, especially during the rains. The land to the northward is very elevated and cold, both rivers and lakes in these parts being completely frozen over, and snow is seen on the mountains when the rains become strong in July and August. When Silva passed, the country west of the Cute was destitute of water, or only to be had in large holes, the remains of the rains. Betwixt the Cute and the Neuda the population was thinly scattered over the country.

The next journey by Silva Porto is the most important. He starts at once in his published narrative from Cutonge, the Kutongo of Dr. Livingstone. This position is correctly fixed, and is consequently of great importance. It stands in  $15^{\circ} 17'$  s. lat., and  $23^{\circ} 24'$  E. long. During the first two days his course was to the south, passing on the second day the river Nambuete. This river is mentioned in the itinerary given by the Arabs who were his companions on the occasion, as we perceive that both itineraries

start from Cutonge, or Kutongo, on the 22nd September, 1853. They passed this river at the ford near one lake 90 feet broad. This journey, be it observed, took place in the spring or driest season of the year. At the end of the second day the course was afterwards east; but as Ibo, on the eastern coast, was looked to as the end of their journey, the course as far as Camimbe may be taken to be east by north. To Camimbe the days' journeys were, with a few exceptions, exactly the same. Silva allows a time equal to that of three miles on account of detentions in passing rivers. The country travelled over was generally plain, and, the season being dry, they had no detentions from rains or floods. In some places there was much brushwood, in some places very large trees, and in other parts trees were wanting. The land was represented as everywhere fertile, and the drought very great. Up to the river Loengue, Silva does not give us the length and breadth of the rivers, which is much to be regretted, simply observing, in reference to his former journeys, regarding each as "already known."

From the commencement of his course east, on the third day of his march, he crossed first the river Liamutenga, at the ford 12 feet broad, and here he gives us an important account of the difference in the magnitude of tropical rivers in the dry as contrasted with the rainy season. In his former journey, which was made in the rainy season, this river was 180 feet (30 fs.) broad. Here we have a ready explanation of the difference in the magnitude of African tropical lakes and rivers as these appear to, and are given by, travellers, without telling us the season of the year when these were visited, seen, and crossed by them. This point, steadily considered, will account for many errors and apparent discrepancies which have baffled and misled inquirers and geographers in every place. Continuing his journey, he encamped on the north side of the lake Hibeno, situated in the country of Luys. Next day he crossed in canoes the river Lui. Dr. Livingstone mentions the valley and state of Lui, Loe, or Milua, at some distance to the eastward of Kutongo. He next day passed the river of Mattendo in canoes. This place is stated in the Arab itinerary. Next he crossed the river Hamengoena, where the country of the people called Guette begins. Farther eastward two days he crossed the river Jongo in canoes. This is doubtless the river Njoke of Livingstone. He next crossed the river Caxeke. In two days more he crossed the river Loamba at the ford. In the journey they felt the want of water, which is only occasionally found in deep holes, and at other times only  $1\frac{1}{2}$  feet deep. Here ends the country of the Guette. Continuing his journey, he, on the third day, crossed the river Cangalla at the ford. Water was very scarce in this distance, and the country very thinly peopled.



From hence to the territory of Cunhinga ridges were frequent. Continuing the journey eastward, he crossed the river Mangoaxe near a great waterfall; water in the way still scarce. Next day he came to the right bank of the river Loengue, Loenge of Livingstone, where the territory of Soba Cahinga begins. Here he visited the chief, and was well received, and readily obtained guides to conduct him and his party to the boundary of his territory to the east. Silva then crossed the Loengue in canoes. It was, he says, the first time he crossed it, and he here corrects an error that he had made in his former journey by wrong information, namely, that the Loengue ran to the sea, but which, he says, he now ascertained from the natives was not the case, but that it was a tributary to the Riambeje. Continuing the journey eastward, he, on the third day, reached Camimbe, where the dominion of the chief of Cahinga terminates. In this distance water was found, the land throughout plain and fertile. From this point the course was changed to the north, and at the end of the fourth day they encamped in a place name unknown, having passed Nhecimo, and Abotte, and on the second day, going north, they crossed the river Cassongae at a ford, marching to the termination of that day's journey along its right bank.

The whole time occupied in travelling to this point was 38 days, of which 11 days were occupied in stoppages, and principally in purchasing provisions. The estimated distance travelled from Kutongo was first south 9 leagues, and then east 162 leagues to Camimbe, and from thence north 30 leagues. These distances would, at 2 geographical miles per league, bring Camimbe to  $15^{\circ} 8'$  s. lat., and  $27^{\circ} 38'$  E. long.; and Loengue to  $15^{\circ}$  lat. s., and  $26^{\circ} 40'$  long. E. River Loengue only about 60 miles distant from the point where Dr. Livingstone reached it, or rather his Kafue.

The country through which they passed is described as fertile plain and generally clear, so that travelling was not difficult, while the weather was constantly dry. In some few parts trees of an enormous size were met with, and in the decayed trunks of some of these excellent water was occasionally found. In the parts most to the eastward a great number of hogs were discovered roaming, and whose flesh afforded a seasonable supply of excellent food to the traveller, who sometimes had little else to depend upon. They were of two species; one, the mountain hog, the smallest, called by the natives Glube; the other, the hog of the plains, called Gime. The food of the former is seeds and roots, and that of the latter ants and reptiles. Honey was also in those places very abundant, and, as a matter of course, wax was plentiful.

The Ohcoinga of the Arab narrative is no doubt the Cahinga of Silva Porto, at which state, close to the great town of Chamopa,

there was, according to the former authority, a great river, called Chamboriro (corruption of the name Zambeze), more than 100 fathoms broad, very deep, and running to the south. This is clearly the river Loengue of Porto. They state it to be half-way between the west and the east coast. Its magnitude corresponds well. But this proof of its being so is scarcely necessary in face of the clear narrative of Porto. Returning for a moment to Camimbe, the course pursued for 13 days by Porto was due north to Camossango, lat.  $12^{\circ}$  S., long.  $27^{\circ} 38'$  E. On the beginning of the sixth day they crossed the Loengue the second time in canoes, the stream there running from east to west. On the morning of the twelfth day they reached the capital of Soba Gaue, on the right margin of the Loengue. Next morning they crossed the Loengue for the third time in canoes, and proceeded by its left bank to Camossango. They passed on their way, beyond Nhoca, first, the small river Hepe; second, the lake Baba Aihava; and third, the river Seamara, four fathoms broad. Lake Baba Aihava is about 1 mile in extent. The country everywhere is represented as fertile, and generally without trees, except about the lakes and the rivers.

From Camossango they pursued their way east to Quicema, a short distance from the Roango or Arroango of the north: the journey to this place occupied 34 days, 3 days of which were occupied in deviations to the south from the general eastern route—the first at Couxito, and the latter at Loquera. During the early portion of the journey they passed two small rivers running to the Loengue, and at the distance of 145 miles east of that river they came to the river Callumbange, 8 fathoms broad. This river rises in the northern portion of the great Muchinga range, and is a tributary to the Roango or Arroango. At about half-way between the Callumbange and the Loengue the country, especially to the north, first becomes hilly, and then rises into high mountains. At Lumbue the territory of Biça Babiça, or Movizas, commences, and terminates near Quicema. It stretches 15 days' journey from east to west, and as much from north to south. In this portion of their journey they passed the considerable states of Ballunda and Iralla, both lying to the south. The people of the states of Luy and Biça are mixed with the original natives of the western parts of Biça. There are two ways or roads from Biça to the eastern coast, and a party of traders from this nation joined Porto's company to proceed to the east coast. Up to the 25th November the weather had been dry, but on that day a considerable fall of rain took place in the journey between Couxito and Longoma.

Pursuing their journey from the Callumbange to the east, they crossed the river Loanguinga, 5 fathoms broad, rising also in the

great Muchinga chain, and carrying its waters southward to the Roango. Next, and at a distance of 70 miles from the Roango, they crossed the river Bissombo, 8 fathoms broad, and soon after the Lunde, 4 fathoms, both coming from the cordillera of the Muchinga chain, and paying tribute to the Roango. At the Bissombo they reached the first culminating point of the cordillera Muchinga, and 20 miles farther east they came to the second culminating point, namely, the majestic Sierra Ueenda, which they crossed. The view from the summit, Porto says, was the most interesting and beautiful he ever beheld or that could be imagined, so grand that he spent a whole day in admiring it. Descending the mountain, they came to and crossed the river Lumbungo, 15 fathoms broad, coming from the great Muchinga chain, and paying tribute to the Roango. Soon afterwards they reached Quicema, whence, bending their course south, about 20 miles, they reached the right bank of the Arroango. It was now the beginning of February, and a considerable quantity of rain had fallen, which had swollen the rivers in those parts much beyond their dry season magnitude. On the 24th January Porto's party was joined by a large company under Major Hicuça, a trader who was about to proceed to a place named Huerua, in the dominions of the sovereign of Zanzibar. The country is described as fertile, but generally with a scanty supply of trees. Wild animals and game were abundant, and elephants particularly numerous around the banks of the Arroango. Rivulets were everywhere numerous. Provisions readily to be had, and the chiefs and people easily reconciled and friendly. The lands of Biça terminate at Quicema. Between Quicema and Cabandangollo, at the side of the Roango, they passed a lake, but did not hear its name.

At Cabandangollo they crossed the Roango, here 15 fathoms broad, in canoes. It runs to the Riambeje, Leambaye, or Zambeze.\* At the point where crossed begins the territory of Cunda. Pursuing their way east during 13 days, 166 miles, they passed the capitals of Cunda and Utumbuca, and came to Mutenga. To the westward of Utumbuca (capital) they came to a very remarkable mountain of granite, called Quicinja, by the side of which flowed to the southward a small rivulet, a tributary, as it must be, to the river Bua. About halfway between the capital of Cunda and the capital of Utumbuca, and at some distance to the

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\* The point where they crossed the river (say  $12^{\circ} 30'$  s. lat., and  $32^{\circ}$  E. long.) is clearly marked in the abstract journal kept by the Arabs, namely, at the river Muata. Now, Gamitto (p. 415) tells us that Muata is a rivulet that bounds the small Portuguese territory of Macambo on the south; and at p. 407 he informs us that Macambo is a small territory belonging specially to the Portuguese, near Mavazamba, and bounded N.W. by the Arroango. The position of this place is therefore accurately fixed, and, being so, forms a clear point which enables us to determine other routes and distances.

north, is a very mountainous country. North from Quicença rivulets were everywhere abundant. It was now the month of March, and rains were heavy and frequent, so as to interrupt travelling even for days together. From Mullinga they marched south one day, and came to the river Ualero on its right bank. At this point the dominions of Soba Utumbuca terminate. There they crossed the river Ualero by a tree-bridge 20 fathoms in extent, and at a great waterfall. In passing the stream two negroes, natives of Biça, tumbled off the slippery bridge and were drowned. The river Ualero is a tributary to the great river Nhionja. At about 30 miles east of the Ualero they reached Nhombuxe. The country was full of rivulets. From Nhombuxe their course diverged to the south two days, passing Comasa and Opaca, and thence east by Guaxe, about 45 miles to Cabanga. At Guaxe they had a good deal of fighting with the barbarous and hostile chief of that place. A few people on each side were killed. The Guaxian loss (65) was by far the most numerous. At length they beat the chief and proceeded on their way. Here there is some darkness in the journal, otherwise well kept. They were occupied in those broils nine days, and he speaks of four days being occupied in passing through these dangerous and hostile latitudes; but whether he means that these four days were in the territory of the Soba of Guaxe, and the extent of his dominions, I cannot exactly make out; but should it be so, as it probably is, then 40 more must be added as it has been to the position of Cabanga to the eastward.

From Cabanga their course again deviated about 40 miles to the south, when they reached the right bank of the river Nhionja; here on the 29th April, the height of the rainy season, one mile broad. They crossed this river in canoes, and proceeded east about 8 miles to Lohengue. The river, Porto says, discharges itself into the sea, directing its course from this point through the country of Inhumbanj. It is no doubt the river known as the Chire, augmented by the waters of the Suaba (the latter perhaps the real Nhionja), which enters the Zambeze about 30 miles below Sena Gamitto, and other Portuguese authorities, expressly state that the Nhanja or Nhionja and the Shire are one and the same river. This river Shire or Chire, the Portuguese say, can be navigated upwards by boats for 30 days. The magnitude of the Nhionja, as given by Porto, must be taken with reference to the season of the year—the very height of the rainy season. What it may be in the dry season may be estimated by considering what Porto has stated about the difference of the magnitude of the Liumutenga in the wet and in the dry season, that is, 30 fathoms in the former and only 2 in the latter—a reduction 15 to 1. Take the Nhionja at the same proportion, and we should have a river 340 feet broad, being still a large stream for the dry season of the year, and which would

require the distance from the point under consideration to the high lands to the south of the lake Marave or Nyassa to form such a stream. At Lohangue the company parted, Major Hieuça and his Biça company taking their way hence to the country of Huerua above mentioned. On the banks of the Nhionja large quantities of fine salt are manufactured and refined; travellers come from a great distance to buy the same. Up to this point the land passed over from the Roango is generally plain, fertile, with plenty of rivulets, and plenty of wild and tame animals, especially elephants. At Cabanga they manufacture good cloth from cotton, both for use and sale. Trees are scanty everywhere, but brushwood is extensive in many parts. From the Ualero, and through the dominions of Saba Quipala, by Opaca, &c., the country is all mountainous.

At Lohangue Porto endeavoured to obtain a guide to conduct him to the sea-coast. He was offered a negro who had escaped from slavery in Mozambique. But the negro himself properly declined the appointment. At last the chief supplied him with one of his subjects to conduct him to another chief at Riamandura, one day's journey distant. Around this latter place the country was mountainous and fertile, but without trees. At Riamandura he considered himself at no great distance from Mozambique, and thought of pursuing the way to Querua, on the sea-coast; but he could not obtain a guide, the chief putting him off from day to day with frivolous excuses. At last, wearied with his detention at this place from the 1st of May to the 6th of June, he arranged with a company of salt-merchants to proceed with them to the country for which the salt was intended. From Riamandura they proceeded due east during five days (45 miles) to Hamataculla, having passed in their way, at one day's journey *separate*, the small states of Lombullo, Borullo, Maxito, and Quipembe; the country plain and fertile, with abundance of rivulets, and a good deal of brushwood. From Hamataculla they turned north, in which direction they travelled four days (40 miles) to Hamatapa, having in their way passed, amongst other places, Lussue. On the first day's march in this direction they passed the river Muamba, 5 fathoms broad, and encamped on its right bank, and which runs to join the river Cassengue. On the second day they crossed the road which ran from the interior to Quicanga, situated on the sea-coast not far from the island of Ibo. Having satisfactorily arranged matters with the salt-merchants for their guidance, he went with them to their towns, situated on the north side of the river Lamupa. After some negotiations with the chief, he obtained guides to conduct him to Mapembe, two days' journey distant on the road he had to go. The country through which they passed in the direction mentioned is described as plain and fertile,

with a good deal of brushwood and abundance of rivulets. It was now approaching the end of June, when the rains may be considered to be over, which shows that these rivulets must be formed from other and more permanent sources of supply than from the rains.

From Hamatapa, Porto continued his journey north for 14 days; crossing on the second day the river Lunupa, 17 fathoms broad, and the river Leesemage, 12 fathoms, and, at the close of the time mentioned, he came to the right bank of the river Losuma, here 1 mile broad at a ford (20th July), passing the residences of the different chiefs, as marked in the map. One day beyond the Lunupa he came to the capital of Mapenda. The country of this name extends north six days' journey; the people of Mapenda were exactly like the population of Loando. Near the Lunupa the country was mountainous. Throughout all this particular route the country was fertile, with abundance of rivulets, and also a good deal of close brushwood; the land was all plain. From the point in the river Losuma or Rovuma, above mentioned, Porto proceeded east seven days (say 77 miles), crossing on the third day from the right bank to the left bank of the Losuma, but, quitting the side of the river on the sixth day, he again took a northerly direction, and at the end of four days (say 40 miles) he came to the sea on the east coast of Africa. The point where he reached the sea-coast must have been a little to the north of Cape Delgado, and in the district of Mangando, or Miquimdame, the country to which, he says, on his first reaching the Losuma, that river ran into the sea. From this point he marched along the sea-coast seven days, travelling, with little interruption, from the dawn of day to six or seven o'clock in the evening, a distance of at least 80 miles. On the third day in this route he crossed the Losuma in canoes, then (8th of August) 1 mile broad, in the rainy season it may be double, and slept in the country of Hionga. We may here observe that, on the first day when he turned in his last northerly route, he crossed a cordillera, the third culminating point he had found in the eastern portion of Africa which he had traversed. He was now amongst an Arab population, who were hospitable and kind. At the end of seven days he embarked in a boat with oars, supplied by an Arab lady, and on the 4th day he landed in the flourishing Portuguese settlement of Ibo. The point where he embarked must have been Muzimbua or Mucimbue, situated on the sea-coast in  $11^{\circ} 19'$  s. lat., and  $40^{\circ} 19'$  e. long., that town being the last place mentioned in the Arab journal before reaching Ibo. In all his last eastern route the country was plain, in some parts woody, and in others covered with prickly brushwood. During the last four days' northing, the country was without water. The country everywhere abounded with all tropical

productions, including sugar-cane; the population, though barbarous, showed a good deal of attention to agriculture. The Macuas are a ferocious race, but he says the people of Maconda are more like wild beasts than human creatures. The chiefs everywhere are engaged in constant quarrels, but in general encourage commerce, from which, by fair means or foul, they obtain their only, yet miserable, revenue. Porto seems to have bent his later course for Mozambique, but at Riamandura he was forced to turn aside from that direction, and subsequently to proceed on his way according to the nature of the country, and as the pleasure of the chiefs and people would permit him.

At Ibo he was well received. There is something touching in his simple and affecting prayer of thanks to Almighty God for his protection throughout his very long and perilous journey. Long and perilous it certainly was. He left Benguela on the 9th of June, 1853, with the Arabs that had come from Zanzibar, accompanied by a considerable number of servants and attendants. In his journey he was joined by more than one large caravan of traders. On the 23rd of August, 1854, he reached Ibo, having of that time spent 190 days in actual travelling, 139 or 144 days of which were in the direction of east. A large portion of this time in his travels was during the rainy season, when the land was in many places inundated, the rivers flooded, and every rivulet become a considerable river. From Ibo Porto went in a small boat with oars by sea in eight days to Mozambique, which place he reached on the 8th of September in the same year. There he some time after embarked in the Portuguese frigate at Fernando, which, after a good voyage, landed him at Benguela; and on the 11th of April, 1856, we find him dating his general journal from Bihe; thus including his very curious and important journey and his journal, which has been exceedingly well and correctly kept, more so than most journals of African travellers that through fifty years of research into the geography of Africa have come in my way. The breadth of Africa, from Benguela to Mucimbue on the east coast, is 1578 geo. miles. The distance travelled in 144 days gives nearly 11 geo. miles made good daily in the direct line, more than half of the distance having been gone over in the dry season of the year. His accounts of the manners and customs of the different tribes, their religion, the productions of the soil, the number and the magnitude of the rivers, and the physical features of the country through which he passed, are correctly and minutely stated, and are thus very interesting.

In taking a general survey of Africa it is at once evident and undeniable that the Portuguese possessions or dominions in Southern Africa are the most valuable and most important and useful portion of that vast and hitherto neglected continent.

Extending along the east coast 1000 geo. miles, and along the west coast 700, they command the entrance into every part of the interior, well known to be comparatively healthy, and all fertile, capable of producing every article of agricultural produce that is known in the tropical world. Their claim also to most of the interior is preferable and well known. More than one river, especially the Zambeze, opens up to some distance a communication with countries in the interior more remote. It is also in many places very populous, but these people are generally engaged in internal wars. The greatest misfortune that ever befel Portugal was the withdrawal of her attention from Africa to the Brazils, and the removing of such multitudes of her population from the former to the latter.\* In Africa itself her population can be best and most profitably employed, and that employment only can regenerate Africa, and raise her to wealth, independence, and civilization, so as to become useful to herself and to the rest of the world. The ablest Portuguese statesmen now clearly understand this truth, and their exertions will shortly produce in Southern Africa as great a revolution in the commerce of the world as the discovery of the Cape of Good Hope did soon after it was made.

It is rather a singular fact that scarcely any of the great African rivers have their navigation unobstructed. The Nile cannot be navigated throughout its great length of 3000 miles: for more than 1500 miles of its middle course it cannot be safely navigated. The Zambeze is not navigable in its upper course, and has even some most serious obstructions in its lower. On both coasts nearly all the rivers have their mouths blocked up by sandbanks and stones. The great Orange river, after a course of more than 1000 miles, enters the sea a diminutive stream. The Cunene is completely blocked up at its mouth by sandbanks. The Coanza is only navigable for a short distance, and this for very small vessels. The Zaire or Congo has a wide and deep mouth, but at a distance of 100 miles from the sea it descends over tremendous, impassable, and terrible cataracts and rapids. The Niger appears to be the most open of the whole through its long course of nearly 2000 miles, but from Boussa \* upwards for a considerable distance (perhaps 400 miles) there is good reason to believe that there are obstructions and dangers in the stream that will render the navigation thereof unsafe for vessels of any considerable burthen. The Senegal is only navigable for about 250 miles, and is on the whole a small stream. The mouths of the Luffia, the Juba, and the

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\* Below Boussa Clapperton emphatically tells us, that, from actual examination, the Niger is not navigable, by reason of rocks and a cataract; and Lander assures us that even during the flood the river above Boussa is dangerous to navigate, even with caoues, on account of the sunk rocks, and ledges of rocks scarcely covered with water.



Dana, on the east coast, are all obstructed at their mouths or in the lower parts of their course, and can never afford much assistance to reach the more populous and fertile districts in the interior. It is also worthy of observation, that in most parts of the interior, particularly in the southern portion of the continent, we find the rivers running through a table-land, narrow and sluggish, but deep, and then descending over rapids and cataracts to join their collected and concentrated outlets to the ocean nearer or more remote from their sources.

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## APPENDIX.

It is of some importance to advert more specifically to some of the tribes and nations mentioned by Porto in his journey through this portion of Southern Africa. Let us consider the following. The Biça, or Babiça, is only another name for the Movizas or Muizas. The country extends, according to Porto, fifteen days' journey from east to west, and the same number from north to south. In this estimate he is very near the truth, as it is nearly the same extent as that given by Lacerda, Monteiro, &c. There is not, says Porto, such another people as the Biça on the face of the globe. He states them to be barbarous and indolent, but nevertheless he calls them a good people, and adds that they are very hospitable. Their country, in the southern portion, is well cultivated, and produces abundantly every tropical production—grains, and fruits, and vegetables fit for the food of man. Their country to the north is plain and open, commanding most extensive prospects. But all this portion of it, from the Upper Zambeze, the boundary, to the north-west, has been nearly desolated by the Arundas, Muembas, or Moluanas, their bitter and barbarous foes, in consequence of which the population is scanty and food scarce, and famines frequent and destructive. This both Lacerda and Monteiro found to their cost. The high Sierras or mountains in the south afford them some protection against their savage foes, and here their cultivation is good, and industry considerable, with many towns, and a denser population. They have plenty of wild and tame animals, both feathered and four-footed. Their towns and dwellings are similar to those in the interior of Angola. Their dwellings, especially in the northern parts of the country, are isolated from each other, and also found at a distance from large towns. They are great traders, and go to the east coast, and also to distant places in the interior. Polygamy is the rule amongst them. They manufacture strong cotton cloth from cotton grown in the country, and make it into garments, called *tanga* in Angola, a kind of robe that covers them from above the loins to the knees. Their towns are built similar to those in the interior of Angola, but with this difference, that the former are always surrounded by a wall. Porto speaks of them as extending towards the Luvar or Luval Levale, and as if they were a similar race, which they probably are. The Levalc are called also the Bianos, and their country is very extensive. The Biça or Muiza are much mixed with the Luy, Balonda (the Londa), and other neighbouring tribes. The whole southern portion of the Moviza country is covered with immense mountains, and thickly intersected by numerous streams and rivers. The great Cordillera Muxenga or Muchinga is situated in their country.

The exact position and extent of Luvar, and places immediately adjacent, are difficult to make out very correctly. The confusion in names of places, and different names being given by different travellers to the same places, renders

the correct analysis of them and the respective countries objects of considerable difficulty. But in Luvar and places adjacent are clearly the points of elevated lands which divide the waters that flow in Southern Africa to the south into the Leambaye, and to the north and north-east into the Cassabe, the Lualaba, and the Luapula. Therefore it becomes necessary to ascertain the points in question with as much precision as possible. Luvar, according to the best Portuguese authorities, lies south-west from Cazembe and the capital of Cazembe. The Arabs who crossed the continent in their journey to the west coast went from Cazembe to Catanga, to Cahava, Maccoma, Cabita, Bunda, the Coanza, Bihe, &c. Between Cahava and the towns of Cabita, they say ('Boletim e Annaes,' No. 22, p. 240), runs the great river Leambaye. But in the account of their journey first received from Benguela, it is said that they went from Cahava by the Musocma road, and that thence to Cabita they travelled along the banks of the Leambaye a good way. At Catanga they met with Major Coimbra and his traders from Bihe, and went forward in company with him. They passed through the towns or countries of Cabita, Bunda, and thence to the Coanza. Bunda comprehends the country west of Libeli, and north of the countries near the source of the Coanza to the high lands of Quiboea, or Quuios. The Hungarian officer Ladislaus (Geog. Journal, vol. xxiv. p. 272) travelled from the sources of the Coanza, first east, then diagonally to the north-east, to Yah Quitcm, on the banks of the Cassabe. At Khandal, in the country of Kahenda, long.  $23^{\circ} 43'$  E., he mentions particularly a branch of the great river Liambege or Leambaye, the rivers Lugebungo, Luana, Lentembo, Lumege, Luma, and Quissamange; the rivers Latembwa and Quissamange are well noticed by Dr. Livingstone; and the Lumege is equally well marked by Graça (No. 10, p. 120). These rivers just mentioned, Ladislaus tells us, flow through the kingdoms of Luvar and Kitui, and are lost in the unknown distance, or, as we know, in the Leambaye. He fell in with Major Coimbra, a Portuguese traveller, who came with him to Quissamba, in the country of Bunda. Graça (No. 10, p. 125) tells us that Quissamba is the town of the Muata, in the kingdom of Quibuica. According to Graça (No. 10, p. 124) Quinhama is on the banks of the Cassabe, one day beyond Catende Mucanza. Quinhama, we also learn, is in Lewin. Pedro tells us ('Aunae Maritimo,' No. 9, p. 430) that Quinhama and Muehinga are not far from the river Lubire, or place Quibure, which is in the land of Cumungo, a state nearer the river Ancula, where Pedro met ambassadors coming from Cabuita Cassenda, in Mahaniso, and with whom he forwarded charts to go to Tete, as he did also at the river Murucuruxy, by some messengers coming from Luvar, on the westward, for the capital of Cazembe.

The truth seems to be that the country named Luvar, Loval, or Lobale, was in former times more extensive than it is found to be at the present time. Such changes are quite common in every part of Africa. In 'Ann. Marit.,' No. 4 of 1833, p. 289, and No. 6 of 1844, p. 159, we read that, in 1795, Silva Alexandre da Texeira, a native of Santarem, in Portugal, went from Benguela to Luval, going by Bihe, the Coanza, &c. The western boundary of the state he says then began at the head of the river Luana (Loena). It was then 60 leagues long by 10 leagues in breadth. In the middle of the state was the capital of Sova Quinhama, the name of the capital, the Sova or chief's name being Luillhame. This chief dwelt, it is stated, to the west of the great river Riambeje (the Leambaye). On the right side the state had Amboellas and Camungo, on its left the great state of the Moluas, in its front Luy, and in its rear Quiboque and Bunda. Graça has told us distinctly where Queboque (Quioeo) and Bunda are, and also Quinhama, the capital of a state situated on the Cassabe.

Silva Porto shows us where Luy and Amboellas are about, and to the north of  $15^{\circ}$  S. lat.; and Graça ('Boletim e Annaes do Conselho Ultramarino,' No. 10,

p. 122) tells us that the river Luaxe is the termination westward of the kingdom of Cabita Catema, and that this state stands in the midst or centre of the lands of Bamba, Bunda, Ohegy, Muningo, Loena, and Cassaby; also that Queoco is in the kingdom of Cabita Catema. Further, that Quinhama is on the Cassabe (east side), 8 leagues beyond Catende Mucanza. Pedro speaks of Quinhama in conjunction with the state of Muchenga, probably also his Moxico. Graça, in his enumeration of the provinces of Muata Yanvo, gives us thus: Luvar, Saceumbuge, Quiboco, Cabenze, Chavahua (can this be the Cahava of the Arabs?—most probably it is, and Saceumbuge the Chaumbuge of Pedro), Dofundo, &c.

Pedro Baptista tells us ('Ann. Maritim.,' No. 9, p. 424, of 1843) that he crossed the Cassabe, and next the Luatele, at Xacahunge, and (in No. 6, p. 237) the station Chaanbuge, a day's journey from Luibaia, perhaps Quiboio. In the same number (239) he tells us that his master, Honorate da Costa, had, in 1797, communications with the chiefs of Bumba and Mujumba Acalunga,\* ruler of all the lands of Sango, under the Jaga of Cassange, in order to induce them to use their authority (Cassange) with the chief of Luvar to permit their united slaves or traders to pass through his country on their way to Cazembe, Tete, &c. This Da Costa hoped to accomplish, through the friendship that then existed, by marriage, between the chief of Cassange and the Sova of Luvar. And he finally did accomplish this object. Bamba is also a point of considerable importance to ascertain, because Pedro, in his interesting journey, specifically mentions it as one day's journey east of the river Coango, on his return. This place, Viscount Sa da Bandeira tells us ('Ann. Maritim.,') is a good place for a colony, because of its salubrity. Pedro took eight days from his starting-point, the fair of Carmo Quiribe, in Cassange, to reach Bamba; thence he was twenty days to Moxico; from Moxico to Catende he took eight days, which state, he says, is a little kingdom subject to the Great Morapo, or Morapue, or Molua. From Catende he was three days to Chaanbuge, and thence two days to Lubaia.

Dr. Livingstone places the Balebale, Lovale, or Luvar, to the west of the Leona, &c., which shows that the territory of the Lovale was contracted in our time, and the territory of the Muropea, or Muata Yanvo, extended more to the westward than it was in the days of Pedro; and about sixty years ago Silva Porto tells us that Luvar extended to the Biça, along by, and intermixed with, the states of Lunda or Muata Yanvo. All these points and facts considered will enable us to fix the positions of Muata Yanvo, Luvar, the Riambege (Leambaye), and the Cassabe with considerable accuracy.

Still Bamba is a point difficult to fix, but probably lies to the north and north-east of Cassange. Colexinga is the ancient country of Queen Xinga, a portion of the tribes of Cassange, &c. Secula Bamba is eight days from Bamba, one day east of the Coango (see 'Ann. Maritim.,' No. 9, of 1843, p. 125), and twenty-two days from the fair of Mucary, which is in a district of the presidency of Ambaca, a few hours' journey to the south of that place, and to the east of the river Lucalla. In the road, at the end of ten days, the river Jombo, or Lombo, was crossed by Pedro on his return.

What has been already fully stated by Ladislaus in reference to the course of the Cassabe, first E.N.E., dividing the petty kingdoms of Luvar and Catma Cabita (the Katema of Livingstone) from the great empire of Lunda or Matianvo, then in Cballa, joining the Lulua or Rurua, and subsequently pursuing its way north-east to the Indian Ocean, at a point to him then unknown, has elsewhere (Geo. Journal, vol. xxiv.) been sufficiently adverted to. In their return journey the Arabs give us Chamopa, a great town on the

\* To Sucilo Bamba, Cambambe, Camaçaca, and Mujumba Acalunga, &c. Sucilo Bamba is a different place from Great Bamba. See Pedro's route.

banks of the river Chanvoriro or Chamovizo. This is the capital of Cahinga, mentioned by Silva Porto, on the banks of the Loengue, or real Zambeze. This is also another name for their river Wumearque, which they say (No. 22, p. 240) is *above* 100 fathoms broad, and very deep; they were obliged to make a raft to cross it. It ran from north to south, and is the real Zambeze, and the Loengue of Porto. The Arabs, in their journal, mark, before entering the territory of the Muiza, Corimba, a river, which they forded (No. 13, p. 136). Gamitto, on his return, mentions Corimba (p. 390, &c.), a town on the banks of the Ruareze. At this place, he says, end the dominions of Cazembe, and those of the Movizas begin. Beyond the Ruareze also, on his return, he found most of the rivers which on the west side descend from the great Cordillera Muchinga, or Muxinga, running to the westward, tributaries certainly to the Ruareze, and next the Loengue, or true Zambeze. These facts are all of considerable importance in showing us the features of the country, and the route of the Arabs with Silva Porto.

Connected with this subject of the sources and the courses of the rivers of this portion of Africa, and the nature of the country where they spring, it may be observed here, that in Pedro Baptista's remarkable journey across the continent in 1806-1813 ('*Annaes Maritimos*,' 1843, No. 5, p. 184, and No. 7, p. 2393), he tells us that from a day's journey west of the river Cavulancango to the little river Lutipuca, travelling east, he, in that space, continued to ascend the "great mountain Cundu Iringo," and that at the Lutipuca he reached the summit of this great range, and descended from it on the east side. This range is no doubt one of the ridges or chains of the lands which a little more to the southward divide the waters which flow south into the Zambeze (Loengue), Leambaye, and Leeha from those of the Luapula and Lualaba flowing north. An inspection of the map will show the accuracy of this delineation. With the exception of the Lutipula (7 fathoms), the Cavulancango (7 fathoms), and Luviry (12 fathoms broad), all the other streams are mere torrents, or rather rivulets.

It is obvious that high or elevated land runs westward from the great Cordillera Muchinga to the high lands nearly in the same parallel of latitude towards Lake Dililo and the sources of the Leeha, which elevated land gives birth to the rivers which run, as we perceive, in an opposite direction—some, such as the Luapula, &c., running to the north, and the others, such as the Locngue and Leambaye, running to the south and south-west. The first rain—that is, heavy rain—that Silva Porto met with was on the 25th November, south of Couxito; but the rains did not become frequent or violent till the end of December, when they became heavy, frequent, and the true tropical rains of the southern hemisphere. Ivory is very abundant in every part of the interior, and merchants come from both coasts to purchase it. Sugar-canes are found in most places, while manioc and Indian corn form the staple food of the population. Elephants are very numerous around the tanks of the Roanga, or Arroanga. The country or territory of Cangomba is very extensive, with many towns. The language spoken by the people is familiar to the two tribes of Luy and Biça, and the population is a mixture of the races of the latter countries. The country abounds with all sorts of game and domestic animals.

Going eastward from the Loengue, Silva Porto found the first culminating point on the west side of the river Bossimo, in say lat.  $12^{\circ} 30'$  s., and long.  $29^{\circ} 50'$  E. The second culminating point, at the summit of Mount Ueenda, is in the same parallel of south latitude, and in  $31^{\circ} 30'$  E. long. The view, he says, from the top of this mountain was, as has already been adverted to, most splendid and magnificent. Gamitto says the same of the higher summit of the Sierra Muchingo, or, as Lacerda called it, Antonina. The scenery on every hand was grand and magnificent beyond description. To the north-west the view was bounded

only by the horizon, extending into the lower ranges to the plains of Cazembe, where the courses of the rivers were marked by the fringes of trees around their borders, which appeared at the distance as if diminished to brushwood. This range stands most majestic, and as if isolated from all others; and Gamitto adds, that all the other high ridges and chains in all that portion of Africa are only dwarfs when compared to it. The ascent from either the east or the west side is extremely difficult and precipitous. Between the east and west culminating points there is a distance of about 16 to 20 miles of undulating land. Its highest summit is in  $12^{\circ}$  s. lat., and  $31^{\circ} 30'$  E. long., probably a few miles north of Silva Porto's true route.

This great chain is in its highest point covered with clouds, but no snow or ice is found on it. It is thickly covered with splendid trees of various tropical descriptions, some of them of a peculiar kind, and in the higher levels with trees and foliage of the temperate latitudes. Numerous rivers rise in the chain, and flow from it in every direction, to the west, to the south, and to the east, and some northerly, hending their courses afterwards to the south-eastward and south-westward. The chain stretches southward towards the Zumbo, and beyond it westward to a great distance, and northward toward the sources of the Arroango and the Zambeze, connecting itself with the lower ridges or sierras which extend northward and north-westward in Cazembe. About 60 miles north-west of Muio Achinto, a range of hills running east to west rises 2600 to 3000 feet above the level of the plains (Gamitto). Lacerda tells us these hills are steep and rugged. Towards Lucenda, at a distance of 20 or 30 miles, lesser hills, running north and south (Gamitto), spread over the country. In former times the valleys of this range were thickly inhabited by the Biças or Muizas, which tribe, once numerous, have been fearfully cut off and scattered by their terrible enemies the Arindas, the conquerors of Cazembe and all the more northern portions of this division of Africa. The Biça or Muiza country extends fifteen days' journey from east to west, and as many from north to south, the boundary on the latter side being in about  $18^{\circ}$  s. lat. To the west they join with the country or people of Luvar. The country on the south-east of Sierra Muchingo belongs to the Chevas; and here begins the kingdom or state of Cunda, and to the north-west the country is now included in the dominions of Cazembe. The Muizas trade with the tribe of Ambos or Arambus, who dwell to the north of Zumbo.

In reference to the immediate state and capital of Yanvo, Graça tells us that the climate is hot but healthy. The land is composed of vast and rich plains, producing all tropical fruits and trees, and amongst other things sugar-canes in great abundance. In the province of Challa the country is mountainous, and much like the country around Ambaca and Gologing Alto, and equally healthy and fruitful. The land is pretty well cultivated. Tropical provisions are abundant. The water is excellent. The rivers abound in excellent fish, which form a considerable portion of the food of the people. The capital is large; the streets wide, running at right angles, and kept very clean and orderly, under the surveillance of an active and well-ordered police. They have spacious markets. The king's palace is a large square enclosure in the centre of the town. Here he keeps a harem of 570 women. The prospect of the country in every direction is magnificent and enchanting. In the capital, and around it, the traveller approaches and sees signs of considerable advances in civilization. All would be most agreeable could the mind only shake itself clear of the thought of the despotism of the government, and the severity of their laws. These, amongst the people who inhabit all this portion of Africa, are written in blood. Punishments are all very cruel, human sacrifices are very frequent, and vast numbers of people are thus immolated. The position of this important place, the capital of Cazembe, and the course of the river, near which it stands, are of much consequence, as, these deter-

mined, it enables us to fix with some degree of accuracy other portions of the interior of Southern Africa (tropical). From what has already been said (see Paper, Journ. R. G. S., vol. for 1856), the true position of Lucenda, the capital of Cazembe, was not materially wrong, and may safely be taken to be  $8^{\circ} 16'$  s. lat., and  $28^{\circ} 29'$  E. long. The lake mentioned by Pereira is about 50 miles s.s.e. of the capital; of its existence there can be no doubt. Pereira crossed it, and waded through it during the greatest part of a day's march. Lacerda saw it at a little distance to the west of his route. Gamitto crossed it in his advance to Lucenda. Each of these travellers was marching in a northerly direction, say north-west. Pereira says that it has two outlets, the one running to the river Morusuro, and the other to the river which he supposed was the New Zambeze, but which was in reality the river Luapula. After crossing the lake, he at some distance came to the river Murusuro, or Luapula, down which he descended during three days and three nights in a canoe (sleeping each night ashore), till he reached the capital of Cazembe. Here we have an invincible fact as to the northerly course of the river. Pedro Baptista says he crossed the Luapula to the south of Lucenda, there above 50 fathoms broad, and *descending* with it, the sun in his march being (that is, the rising sun, or east) on his right hand. Gamitto mentions the river as being three days' journey distant from Lucenda, in a north-east direction, and that the small streams near the capital, and the outlet of Lake Mofo, run north-west to the river. There can, therefore, be no doubt that the river Luapula runs to the north and north-east, and Pedro tells us that all the rivers that he crossed in his march eastward to Cazembe, from the Murucurixy, ran to join it—the Luvirey (12 fathoms broad), the Carulencange (8 fathoms), and the Lutipuea (8 fathoms), with their numerous smaller tributaries. All the latter, and indeed all the other streams to the eastward of the Lualaba, were rivulets or brooks. The magnitude of all these streams marks the dividing ridge or watershed as lying to the south, and at no great distance. The time when Pedro crossed was in October, the dry season. In short, all these travellers considered that the Luapula was the head-waters of the Xire or Chire, which after all may be the fact.

Much confusion has been produced in African geography by the course which he gave to the Zambeze when he first reached it, namely, that it was contrary to the course of the Zambeze of Tete. So it apparently was, because at that place it ran, as Gamitto tells us, to the westward, or w.s.w.; but it does not follow from this that it joined the Luapula. He tells us (Pereira) that his New Zambeze runs from the right hand of those who go from Tete to Cazembe; and so Lacerda and Gamitto found it. These few clear and explicit facts attended to determine clearly the early course of this great and remarkable river.

In reference to the empire of Monomatapa, or more correctly Chedim, Gamitto tells us (p. 429) that it is of great extent, beginning on the south side of the Zambeze, a little above Tete, and stretching westward beyond Zumbo. It is divided into several districts or provinces. The same traveller tells us (p. 421) that the river Chire is the same as the Nhanja; thus, when alluding to the course of the Chire, he says, "the Chire or Nhanja." He also tells us (p. 402) that the Sierra Muchingo traverses an immense extent of the interior, generally in the direction of north and south. A little to the eastward of the main ridge, he informs us, is situated the town of Chinto Capinda, not far from a small lake. This is probably the place mentioned by Silva Porto, and which belongs to the Bigas or Muizas.

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XII.—*Journey of Galvao da Silva to Manica Gold Fields, &c., in 1788, with Description of the Country South of the Lower Zambeze.* By JAMES MACQUEEN, Esq., F.R.G.S.

Read, June 27, 1859.

THE periodicals now publishing monthly at Lisbon give us much interesting information regarding the Portuguese possessions in Africa. The Portuguese Government, under the enlightened rule of their present Colonial Minister, Viscount Sa da Bandeira, are searching out from their archives, home and colonial, interesting and valuable journals of journeys, undertaken under the auspices and orders of former rulers, made by different individuals, and are giving these publicity. Amongst other interesting documents of this kind is the journey of Manuel Galvao da Silva in 1788, by command of the Governor-General of Eastern Africa, to the kingdom of Manica, and the famous gold-mines situated in that portion of Africa. This gentleman had previously been in the Brazils, and was well acquainted with the mining operations carried on in that province, and consequently a proper judge to examine the operations in that part of Africa called Manica, generally believed to be the Ophir of Solomon.

This journey of Galvao Silva enables us to correct the error which has hitherto prevailed regarding some important points in that portion of Eastern Africa, and is, therefore, at this moment particularly valuable. He left Sena on the 19th August, 1788, and at the end of four days he reached Santa, a fief of the crown of Portugal. Here he abode nine days. He set out again on the 1st September, and passing Sangue, another fief of the crown, he reached at the end of the fourth day the river Muaze, in the kingdom of Barue, where he was detained a day or more, and hospitably entertained by the Mambo or chief of Barue, who was anxious to trade with him. Pursuing his way, he crossed on the 6th September the river Xitora, and, soon after, the river Inhanzana, with its current so large that it could not be waded, and turbulent from the number of large stones in its bed. In a few days after, he crossed the river Arroango (Arroenba), which separates the kingdom of Barue from that of Manica. In his journey onwards the population of the surrounding towns and villages quitted their homes to see them and to receive them, for the purpose both of curiosity and traffic. Advancing, he reached the river Muvuze, where, during the night, the cold was almost insupportable, and next day in the afternoon he reached the celebrated fair of Manica, held near the capital, Massappa. The position of this place is fixed and checked by the estimated distance (about 50 leagues) from Sena to the south-west, and the distance of 55 leagues from Tele to the s.s.w., and will thus be in about 18° 40' S. lat., and 31° 50' E. long. Half-way between Sena and Massappa are found great mountains, composed chiefly of fine marble, and from which range several rivers flow, all abounding with crocodiles.

The place for the celebrated fair of Manica is situated between two small rivers, the Revue and the Mucorumaze, and is about two miles in circumference. This space is intersected with rivulets. The rivers mentioned are tributaries to the Mungora, running from the southward, at a few miles distant to the west, and joined by the river Mazavios. Descending from the south-westward from the mountains of Fura, their united streams are below joined by the Rueuto, and soon afterwards by the united streams of the Revue and Mucorumaze. The country around is hilly. In early times the quantity of gold annually found here was large. When Galvao da Silva was there the supply was much reduced, owing to the insecurity which reigned in the district, and from the sluggish and careless manner that the natives performed the work.

carrying it on chiefly near the surface of the earth. They dig openings about 6 feet in depth, and about 12 feet in diameter, and by the rudest process, simply by water from the adjoining streams, separate the ore from the earth. The gold thus obtained is afterwards carried to Sena (chiefly) and Tete, and thence to Mozambique, &c. In the mountains of Fura the precious metal is very abundant, and in a state called Manica it is found in white quartz, and is called by the natives white gold. Galvao da Silva was very anxious to see this, but the king or chief of the place hindered him. Iron-mines abound. The ore runs horizontally in the hills: it is melted into bars to be exported.

Massappa, and this fair, was at one time a most important place. It was regularly and well fortified, and had a regular garrison of considerable strength. In 1788 all was gone to ruin, and one piece of artillery only guarded its dilapidated walls. It had a small church, built of stone and brick, and covered with straw, dedicated to Senhora de Rosario.

When the Portuguese first subdued this state they advanced from Sofala through Quiteve, and extended their arms and conquests westward as far as the mountains of Abutua. This fact is important, because it shows that Abutua is not situated to the westward of the Zumbo, but at a considerable distance to the south of it. The fair or market of Manica was reduced to a deplorable state by the misconduct of a Portuguese governor, who was attacked by the great African chief Chingamera. This chief, whose extensive dominions were situated to the westward, extending on the southern banks of the Zambeze, and along these exceedingly mountainous districts, about and to the eastward of the present residence of Moselakatse, invaded and ruined Manica and the adjoining districts, and made them his tributaries. He placed over them one of his generals, named Chikango, which is thus the name of a ruler, and not of a state, as has hitherto been supposed; this chief again delegated his power at the fair of Manica to one of his favourite women, who collected the tribute for him, taking, like a prudent woman, good care of herself at the same time. The kingdom of Chingamera begins at forty days' journey west of Sofala. Manica extends to within a few days' journey of the Zimbaoe, or capital of Quissanga, situated on the river of Sabia, or, rather, the Chitassa.

The kingdom of Barue extends to the north-westward, along the confines of the province of Sena to that of Tete, where it is again met to the westward by the state of Sungue. All these, and several other states, at an early period, formed part of the great empire of Monomotapa, which included Sofala, or Quiteve, and Quissanga. Early writers represent it as an island, 700 French leagues in circumference, say 1600 miles, surrounded, in a great measure, by the Zambeze and its tributaries. The inspection of the map shows that this, in Eastern phraseology, was no bad delineation, as a tributary of the Zambeze reaches near to the head of the river of Sofala. To the south of Sena and the Zambeze the country is low, until at some distance it rises in the very high chain which separates the province of Sena from the country of Sofala.

Chicova, which abounds in silver, lies about N.N.W. of Manica and Zumbo, west-by-north of Chicova. To the southward of the state of Chicova lie Shangra, Tippooe, and Abutua. In the parallel of  $19^{\circ} 30'$ , to  $20^{\circ} 30'$ , S. lat., a vast chain of mountainous country runs eastward from the hill Ngwe to near Sofala, these mountains rising to the height of 7000 to 8000 feet above the sea.

Soon after his conquest Chingamera granted permission to the Portuguese to resume the fair, and to an officer belonging to them to reside there, to superintend it, upon payment yearly of one piece of Indian dimity, valued at 55s. In this state things stood when Galvao da Silva visited it. But the place and trade continued to decline, along with the other possessions of the Portuguese



in Africa. In the year 1854 the chief of the district sent to the Governor-General of Mozambique, requesting him to renew the trade, and to send an officer to reside there to superintend affairs for him, which was readily acceded to. In consequence of this movement Manica will probably soon rise into greater importance than ever.

Major Gamitto, in his able Survey of the Portuguese Colonial System and Colonies in Eastern Africa, has given us much valuable information regarding the whole, and especially of the Lower Zambeze. This work was drawn up in 1850, from practical personal knowledge of these possessions and places, and published at Lisbon, in the '*Boletim e Annaes do Conselho Ultramarino*,' of May, June, and July, 1854. His information given concerning the Lower Zambeze agrees well with that given by Lieutenant Brown, one of the officers belonging to Captain Owen's surveying expedition, who went up the river as far as Sena. Himself and his companions were cut off by death from the pestilential fevers generated on the banks of the river, but his observations and papers were preserved, and reached his commanding officer in safety. According to Owen's survey, Quillimane is distant 10 miles in a north direction from Point Tangolane, at the eastern entrance to the river. At the town the river is about 1 mile broad; its bed hence upwards is about w.s.w., and gradually narrows from one-tenth of a mile to 300 yards, till, after passing through an archipelago of small islands, it narrows to 30, and to 20 yards at the village of Moombush, situated at Boca de Rio, or gullet of the river. Here there is, in the dry season, scarcely water to float a canoe.

From thence at that season the journey is made by land, occasionally coming upon the stream here and there, scarcely more than 16 to 20 feet broad, but with high banks on either side. At the end of three days' journey the traveller comes to the village of Masoora, or Mazora, situated on the east bank of the Zambeze, at the point where it separates into three branches: the small one going to Quillimane; a very large branch called the Musamhay running to the sea, in the middle of the Delta, and which is navigable for vessels of large tonnage; and, thirdly, the Luaba, which enters the sea, according to Owen, in  $18^{\circ} 55'$  S. lat., and  $35^{\circ} 55'$  E. long.; but, according to Parker, in  $18^{\circ} 50'$  S. lat., and  $36^{\circ} 12'$  E. long. The depth of the water at ebb-tide was  $2\frac{1}{2}$  and  $3\frac{1}{2}$  fathoms in the channels, the width about  $2\frac{1}{2}$  miles, and the tide rises 20 feet. There are some discrepancies amongst the different observers. Owen places Quillimane town in lat. S.  $17^{\circ} 51' 4''$ , long. E.  $36^{\circ} 51' 3''$ ; Gamitto,  $17^{\circ} 43'$  ditto; Lacerda, lat. S.  $17^{\circ} 54' 24''$ , long. E.  $36^{\circ} 34' 15''$ , making a difference of  $17'$  in long. Owen places Tangolane Point in  $18^{\circ} 1' 4''$  S. lat., and Lacerda places it in  $18^{\circ} 0' 12''$ .

The distance from Quillimane to the Boca de Rio is, in a direct line, 47 miles. The tide flows up till within 10 miles of this place, and it may be supposed that it flows an equal distance up the river Musambay and the Luaba, and which would bring the flow almost to the point of the division or separation of the streams. The Delta is all low, and goes by the name of Chingoma. While the Quillimane branch where it goes off is so narrow in the dry season, Gamitto tells us that the real breadth is about 80 fathoms during the flood, and that the river there washes over this space or dyke with great force and rapidity. The bottom of the stream is composed of loose sand thrown into it by the Zambeze, which here throws up a bank of sand and mud, extending over a space of 3 miles in the dry season, then spreading the most pestilential effluvia. Above the point of separation the Zambeze makes a most remarkable curve. It turns, as it were, "*upon itself*," says Gamitto. To the north of this is the chain of hills called Yemale, beautifully wooded, rising to the height of 800 to 1000 feet on the east side of the Zambeze, and to the north-west, on the same side of the river, appears the huge mass of the mountains of Morambula, above 3000 feet high, also finely wooded, and cut

by deep ravines. The Quillimane branch is properly called the Mutu. Three rivers (one of that name) enter it from the north, above the town of Quillimane. This town contains about 15,000 inhabitants, who are stated by Gamitto to be the most profligate, immoral, and licentious (especially the female portion thereof) to be found in the world.

From Mazaro to Chipongo is one day's voyage by water, at the rate of 1½ mile per hour, or say 16 miles. This will bring the distance, in direct lines, between Quillimane and Chipongo, to 100 geographical miles. Lacerda places Chipongo in 18° 18' S. lat., and 35° 15' E. long. From this to the mouth of the Luaha is, in a direct line, 65 geographical miles, and to Quillimane 100 miles, which distance agrees very well with his observed longitudes. The depth of the river from Mazaro to Chipongo, in the dry season, was from 2 feet to 2 fathoms, according to the channels taken. The banks and sand islands, 20 feet in height, are all overflowed in the rains. The magnitude and extent of the Zambeze are well ascertained from Owen's account, which states, Vol. II., that it is the largest river that enters the sea in all the east coast of Africa. "So great," says he, "is the rush of the floods from the various months (seven in number), that even 10 miles from the land the water is perfectly fresh!"

From Chipongo to Sena is, according to Gamitto, nine days' journey by water. Lieutenant Brown makes it seven or eight days; but he, perhaps, travelled quicker than the ordinary travellers. The distance is about 50 miles. The river about 1 mile broad. The river Shire, Chire, or Xire, enters the Zambeze on the east side, about 30 miles below Sena, with a rapid current.\* This is an important river, and it is said that it can be ascended in boats, northwards, to the distance of thirty days' journey, or 300 miles. Sena is placed by Lacerda in 17° 30' 50" S. lat., and 34° 45' 16" E. long. Brown places it in 17° 30' S. lat., but in 35° 38' 8" E. long., making a difference in longitude of 53'. This will still give nearly the same difference in longitude, in reference to Quillimane, as that by Lacerda. Which is the correct longitude it is impossible here to determine. Sena is, at present, a poor straggling place, with a few houses built of unburnt bricks and clay, and covered with straw, constructed without any regularity, and placed at a distance from each other. It stands on the west side of the Zambeze, and below a hill called Baranunana. It has a small garrison, located amidst buildings which scarcely deserve the name of fortifications. It carries on a trade by the Zambeze, upwards and downwards, and also with the states of Barue, Manica, and others to the southward and westward. This place, now so sadly reduced, was formerly rich and populous, had a college, and was the seat of a bishop. The white population consists of about thirty of both sexes.

From Sena to Tete is a journey of twenty-four days by water. During twelve days they navigate by the west margin of the river, on the 13th they reach the Lupata, and thence to Tete they navigate by the east or north bank. At the Lupata the river, from a breadth of 450 fathoms, is contracted to the breadth of 200 fathoms, which renders the current at all times rapid, and so strong that it is very difficult to stem it. Lacerda could not, and was compelled to take the road by land until the gorge was passed. So strong is the current, that it takes the boatmen four days to traverse the distance of only 12 miles through the gorge. They impel the boats by paddles, poles, and draw them also by ropes or lines made from the bark of the palm-trees. Having passed the Lupata, they rest one day to repair their tackle. The

\* Gamitto states pointedly that the Shire runs on the West side of the Morambula mountains; the lake called Zachof, known to the Portuguese 240 years ago, connected with and on the Shire, extended from 15° to 15° 50' S. lat., and in about 36° E. long.

navigation of the river upwards to Tete is much impeded by stones and rocks, and the strength of current amongst them is, according to Gamitto, generally from 7 to 9 miles per hour. At the western entrance of the Lupata is situated the small island of Mozambique, on the river. Lacerda places it in  $16^{\circ} 31' S.$  lat., and Livingstone in  $16^{\circ} 34'.$  A short distance above the Lupata the Zambeze is joined on the south side by the Arruenha, or Arroango, the collected waters of the streams from the regions of Manica. At all times this is a considerable river.

At Tete the Zambeze is above 460 fathoms broad. Tete is separated from Barue and Sena by the land of Sungue, and bounded to the interior to the southward by Tambara, Tepooi, and Massangano. These states begin at and south of the Zambeze, and go many leagues into the interior. The Arroango divides the lands of Tete from the territory of Sena, and the part of Manica where the fair is separated from Barue by the Arroango. Tete is covered on the south by the Sierra Cari. It has been nearly ruined by the wars with Monomotapa, and their neighbours the Minhaes. This province (Tete) is rich in gold, iron, and coal. The latter is found near the river Revugo. Tete trades with the Muzurumes and Zumbo. Tete is elevated and salubrious, the country round being rocky. The gorge of the river called Lupata is formed by the stream forcing its way through the Sierra Cuverantenga. Tete carries on much trade with the country of the Maraves, an industrious people inhabiting a fertile and healthy country to the north of the Zambeze, abounding in many places with gold, iron, &c., especially about Java and the river Bua. The climate of Tete is favourable for agriculture, and the soil fertile, producing readily cotton, coffee, sugar-cane, and all articles of tropical produce, fruits, and vegetables. Tete has a garrison of 200 Caçadores, and 28 pieces of artillery, and a considerable native force can at any time be quickly assembled. The neighbouring country is mountainous, covered with woods and forests.

From Cape Delgado southward the Portuguese have a string of settlements along the coast of the Indian Ocean, but little known, and, though small and detached as they are, yet, as a whole, they are of some importance, both as regards population and trade. The archipelago of Cape Delgado comprises 28 isles, between  $10^{\circ} 41' S.$  lat. and the river Lurio in  $13^{\circ} 31' S.$  lat. In several places in this distance there are good anchorages. The population of these settlements stand as under:—

	Christian.	Moors.	Banians.	Ballas.	Christian.	Moors.	Total.
	Free.				Slaves.	Slaves.	
Ibo .. .. .	467	143	13	8	1333	137	2,422
Querimba .. .. .	58	7	..	..	107	40	212
Pemba .. .. .	29	3	..	..	36	21	85
Matemo .. .. .	15	8	..	..	33	32	110
Arimba .. .. .	63	30	..	..	115	103	331
Montessa .. .. .	58	73	..	..	203	266	660
Quissanga .. .. .	5	218	..	..	287	1003	1,514
Lumbo .. .. .	68	57	..	..	210	280	615
Pangare .. .. .	7	40	..	..	163	110	320
Mucimba .. .. .	29	32	..	..	187	150	398
Lurio Demba (slaves)	..	..	..	..	5154	..	6,594
Tangue (free) .. ..	1440	..	..	..	..	..	
Total							13,331

The distance from Ibo to Mozambique by land is ten days' journey by the regular course. This coast is generally healthy, and the facility of trading with the people of the interior is very considerable: some of the tribes are peaceable.

In 1808 the trade of the province of Mozambique was as under:—

Gold .. .. .	100,000 cruzados.
Ivory .. .. .	525,000 „
Slaves .. .. .	192,000 „
Rice .. .. .	112,000 „
Wheat .. .. .	61,420 „
Miscellaneous .. .. .	100,000 „

Total .. .. . 1,090,420

Or about 150,025*l.* sterling.

The revenue of the Crown from the rivers of Sena was—

48 Crown estates, district Tete, fines .. ..	708,322½ cruzados.
6 Exchequer ditto .. .. .	56,077½ „
27 Crown estates, district Sena .. .. .	1,587,957½ „
4 Exchequer ditto ditto .. .. .	97,375 „
13 Crown estates, district Quillimane .. ..	421,441½ „
2 Exchequer ditto ditto .. .. .	88,666 „

Total .. .. . 2,960,000

about 450,000*l.* sterling.\*

*Portuguese Military Force in East Africa.*

	Artillery.	Cavalry.	Caçadores.	Infantry.	Total.
Mozambique .. ..	100	..	415	415	930
Isle de Ibo .. ..	30	..	..	140	170
Quillimane .. ..	25	25	200	..	250
Sena .. .. .	25	25	200	..	250
Marrion .. .. .	10	..	160	..	170
Tete .. .. .	25	..	200	..	225
Zumbo .. .. .	10	..	160	..	170
Sofala .. .. .	25	50	100	100	275
Inhambane .. ..	30	50	100	100	280
Lourenza de Marquesa	30	50	100	100	280
Totals .. .. .	310	200	1635	855	3000

Exclusive of the native militia force, drilled under European officers, which is very considerable, and which can be increased to a great extent.

The following, from the same authority, is, or rather was a few years ago, the export of Zanzibar:—

400,000 frazelas †	(Indian corn.)
350,000 „	de Cravo Giro. (Cloves and spices.)
30,000 „	gum.
14,000 „	ivory.
10,000 „	pimento.

Vessels frequenting the port yearly are as follows:—

Americans .. .. .	12 ships from 200 to 300 tons.
French .. .. .	6 ships from 400 to 600 tons.
Hamburg .. .. .	6 ships from 190 to 200 tons.
English .. .. .	2 ships from 150 to 200 tons.
Imam Muscat .. ..	3 to 4 of long voyages.

\* See Memoir by Senhor Ferao, *Journal Royal Geographical Society*, vol. ii.

† The frazelas is equal to 34 lbs. Portuguese.—No. XX., pp. 211–222.

*Stages from Sena to Tete.*

- |   |  |
|---|--|
| <ol style="list-style-type: none"> <li>1. Sena to Prazo Sorre.</li> <li>2. Sorre to Chemba.</li> <li>3. Chemba to Inhacaranga.</li> <li>4. Inhacaranga to Port Anguera.</li> <li>5. Ditto to Anguera.</li> <li>6. Anguera to Boundary ditto.</li> <li>7. Boundary to Chiramba.</li> <li>8. Chiramba to Miringonde.</li> <li>9. Miringonde to Inhurassue.</li> </ol> | <p>margin. In mouth of the Lupata. Spend three days to repair the towing-ropes in order to proceed by river to Tete. Very difficult, because of rocks in it.</p> <ol style="list-style-type: none"> <li>14. Bandar to Mocomaze.</li> <li>15. Mocomaze to Cancoma; end Lupata and beginning of district of Tete.</li> <li>16. Cancoma to Luana.</li> <li>17. Luana to Chuze.</li> <li>18. Chuze to Inhunnerma.</li> <li>19. Inhunnerma to Domue.</li> <li>20. Domue to Cassunha.</li> <li>21. Cassunha to Inhalupunda.</li> <li>22. Inhalupunda to Inhabaruavo.</li> <li>23. Inhabaruavo to Bengo.</li> <li>24. Bengo to Tete.</li> </ol> |
|---|--|

- Inhurassue, in territory of Botangas and limits of Sena.
10. Inhurassue to Chituze.
  11. Chituze to Chegogo.
  12. Chegogo to Matope.
  13. Matope to Bandar.

Up to 12th day navigate by left or east margin of Zambeze, and again on 13th by right

From Bandar the navigation is by the right bank or side of the river. The journey by land is seldom taken, and only by negroes.

Land about Tete elevated and craggy. To the south it is covered by the Sierra Camera. Gamitto, 'Boletim e Annaes,' &c., No. 4 of 1854, pp. 33, 34.

Sena to M. Lupata .. .. .	12 days.
In ditto .. .. .	1 day.
To end Lupata .. .. .	2 days.
Beginning district Tete to Tete .. .. .	9 days.

Total .. .. . 24 days.

### XIII.—*Journey of João Francisco from Massomedes to Caemdo in 1841.\** By JAMES MACQUEEN, Esq., F.R.G.S.

*Read, June 27, 1859.*

ON the above day the party left the bay; went along and crossed the Baro to a place called Maubal. After proceeding a little to the north-east, their course became nearly due east; the country overspread with hills, mountains, and valleys, with many streams of water, but in that season of the year, the dry season, very low, and some of them having only pools of water standing in their beds. In their course eastward they crossed the different rivers marked on the map, most of them branches of the river Queena, bending their course north-westerly to that river, and some, in their farther advance, running to the Baro, as they approached the river Caclavalar, or Caclavale. On the eleventh day of their march passed the capital of the Sova of Huila. The river Caclavale all comes from two lakes situated to the north-east. It has always water in it, and during the rains impedes travelling. The distance from Massomedes to this river about 60 leagues, which, as the days' journeys were short, and in the dry season, may be taken at 150 geographical miles. The capital of Huila, or Ohila, in 15° 2' s. lat., and 13° 20' e. long., only about two days' journey from the Caclavale. In one day's advance they touched upon a southern district of Quillingues, beyond the river Fata (always water), and near the great mountain Munda de Locondo. The chiefs received him

\* See Map in the Journal of the Society for 1856.

kindly. On the twentieth day came to, or near to, high mountains, called Nanno, running north to south, and thence eastward. Quillingues is surrounded by high sierras. On the twenty-first day came first to the river Humvino, and next to the river Vliume, and on the evening of the next day came to the river Quie, not broad but deep; the days' journeys now became long (10 leagues). The lands here were covered with great trees, abundance of vegetation, and humid plains called Nhanas. On the twenty-third day of the journey came to Culaquimbe, a dependency of Caconda; and next day they entered the Presidency of Caconda, a small fortification, with a garrison, commanded by Joaquim Ferreira de Andrade. The country around this is healthy and fertile. Near the fort is the deep, sluggish river Cathape. Rivulets are numerous, and always have water. All tropical produce thrives here, as the land is excellent. Sugar, coffee, &c., can be produced in any quantities. The country of Quando, one day's journey distant eastward, is extensive, and has a considerable river of the same name, which runs to the Cuncue, but it is not navigable on account of great stones and waterfalls in its bed. The river Quando is three days east of Caconda, and the Cunene about five days. The river Cunene is similarly impeded. Caconda has a church covered with straw. To the south-south-east of Caconda is the country of Irumbo, where the river Cunene, its eastern boundary, is, according to Brocheda (p. 190), only from 50 to 60 fathoms broad—say 330 feet.

The distance from the river Caculavale to Caconda is about 40 leagues, which may be taken at 100 geographical miles. The river Cubango is the western boundary of the Quillingues, a numerous people that spread over the country eastward to near the river Leambaye, and north-east, beyond Bihe, to the Lobale.

#### XIV.—*Notes on the Lower Danube.* By Major J. STOKES, R.E.

Communicated by Capt. R. COLLINSON, R.N., F.R.G.S.

Read, May 9, 1859.

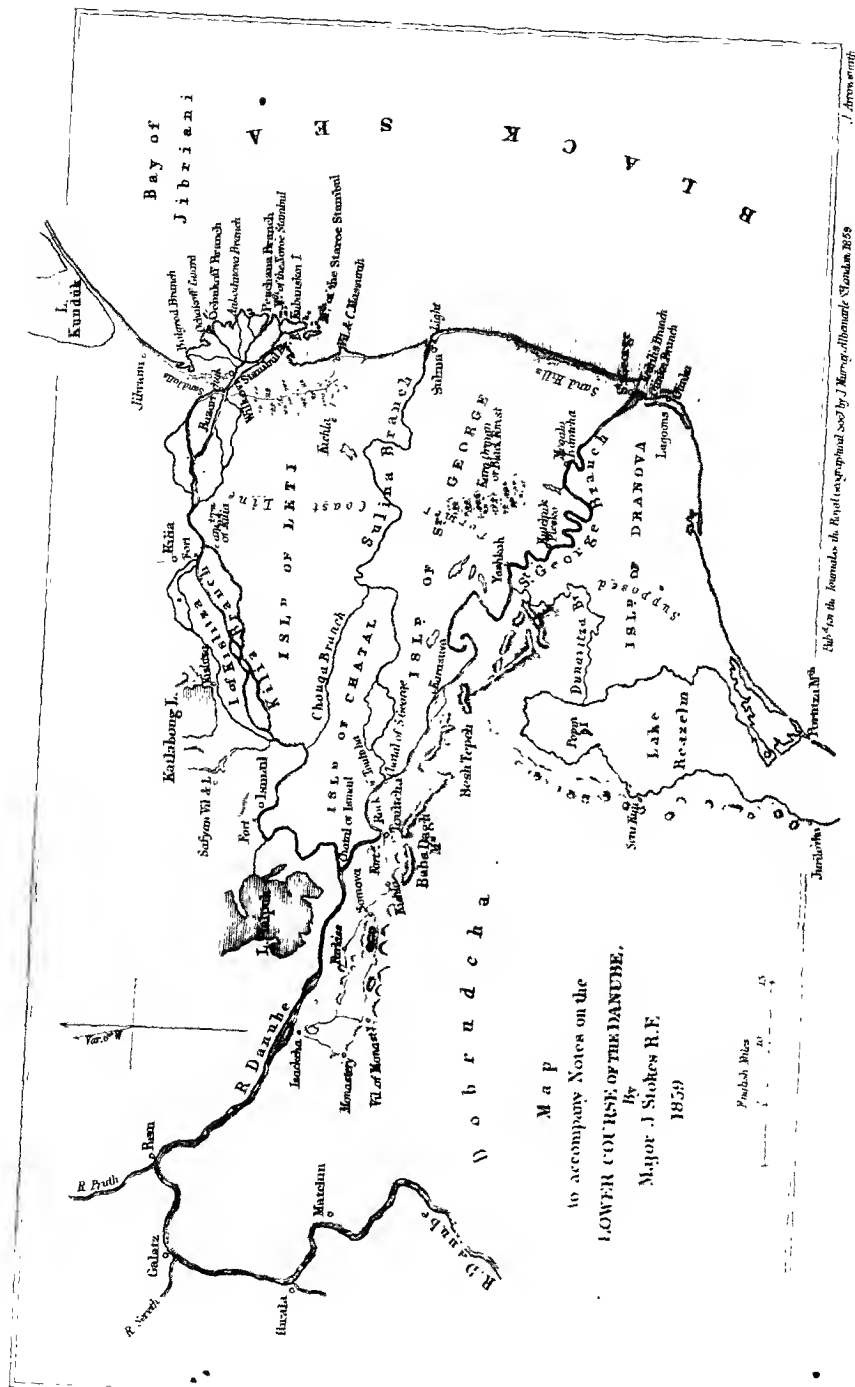
[For miles above Orsova, the Danube flows between high mountains, which compress its waters into a narrow, rocky channel, through which it hurries with great velocity. These would seem to be the true Iron Gates of the Danube; although the name has been given to the shallow rapids below Orsova.

After passing these rapids, the river is called the Lower Danube, and entirely changes its character. The stream, which had till then been dashing down a rocky bed in one single channel, gradually loses its force, and spreads into several channels through the soft alluvium of the valley, whose features it is constantly employed in changing, adding to this island, destroying that, or creating new ones.

The broad valley through which it flows is bounded on the right by the Servian and Bulgarian Hills, and on the left by the steppes of Wallachia and Moldavia. The right bank, which in its whole course is thus much higher than the left, is generally rocky and unyielding, whilst the left is soft and easily removed by the action of the river.

These general characteristics are maintained to the head of the Delta, and thence continue down the St. George, to within 30 miles of the sea.]

From the Iron Gates to the junction of its last tributary the Pruth, the Danube is swollen by many streams from the Carpathian Mountains, which traverse the fertile plains of Wallachia







and Moldavia. During the 400 miles from the Iron Gates to Galatz, the river, as has been already remarked, frequently spreads into several channels, which re-unite at intervals. The depths in these channels vary so frequently, that their navigation is extremely difficult; for not only do the depths vary with the changing heights of the river, dependent on the floods caused by rains and melting snows, but the beds of the channel are affected, not only from year to year, but from month to month, by the deposits of the river, and by its action on the banks and islands. Thus the charts of the river are of little use for navigation, as they become falsified in a very short time by the frequent changes. There are seasons of the year when vessels drawing 8 or 9 feet of water can ascend to Turna Severin, and even above the Iron Gates; but the current at such seasons is very strong, and it is only during a few weeks that the navigation is practicable for such large vessels.

The principal vessels engaged on this part of the river draw no more than 4 feet of water to enable them to navigate at all seasons, and even these vessels are unable to pass the rapids of the Iron Gates during the autumn. Sea-going vessels seldom, if ever, ascend the river beyond Oltenitza, and, for sailing vessels, it is considered an unwise operation to go even so high, because the distance for which they have to contend against a still strong current is so great that it generally pays better to bring the corn, which is the staple produce of the country, down to Ibraila. Indeed, it is generally supposed that eventually all produce will be taken to the mouth of the river, and shipped in the port that will be afforded in the St. George mouth, as the width of that branch will permit of the river craft being towed economically, an operation that cannot be effected in the narrow Sulina, the only branch navigated at present.

Before Galatz, the Danube continues in one noble stream in a south-easterly direction to the head of the Delta, a distance of 45 miles. For this space it preserves an average width of three quarters of a mile, and a depth of at least 28 feet, which is sufficient for all purposes of navigation.

At the Ismail Chatal (or fork) the Kilia Branch, containing 17-27ths of the whole stream, takes a northerly direction, and after passing the towns of Ismail and Kilia, forms a delta of its own, through which it discharges itself by five principal mouths into the Black Sea.

The Kilia branch preserves the characteristic which has marked the river between Turna Severin and Galatz. Below Ismail it separates into three channels, all of which are, however, navigable. These channels reunite at Staroi Kilia, 2 miles below the town of Kilia, and 5 miles lower down it again divides into three branches, which unite near the hamlet of Bazartchuk, to form the large

basin of Wilkovi, whence spring the five principal channels which form the Kilia Delta.

Below the Ismail Chatal, the remaining 10-27ths of the stream continue the general south-easterly direction of the main river. In passing the town of Toultscha, however, the river makes a sudden bend, caused by a projecting spur of one of the Babadagh Mountains which here stands forth into the stream, and constitutes the danger known to mariners as the Toultscha Rock. The danger consists in the eddies which play round the point of the rock, a detached portion of which is submerged: vessels striking upon this point sink in a depth of 80 feet. The danger is, however, so well known, that accidents are not frequent, although vessels are sometimes wilfully injured on the rock by the pilots, in order to obtain employment for their friends in Toultscha.

At 6 miles below Toultscha, or 11 below the Ismail Chatal, the river becomes again divided, 3-4ths of the Toultscha branch, or 8-27ths of the whole river, continuing the s.e. direction under the name of the St. George branch, and the remainder—"the Sulina"—flowing in a general easterly direction to the sea.

The St. George, although the most tortuous of the branches of the Danube Delta, possesses the advantage over the Kilia of maintaining itself in one broad deep channel until just before reaching the sea, whilst it is superior to the Sulina in being free from the numerous shoals which obstruct the course of the latter, and in possessing a navigable channel three times wider than the Sulina in its best part.

The St. George may be considered the most southern branch of the Danube, for the little stream of Dunavitza, which connects it with the lake Reazelm, is too insignificant to deserve the title of "branch of the Danube," which has been bestowed upon it by some writers.

The St. George is not yet used by vessels trading to the Danube, as its entrance is obstructed by a bar, through which the unaided current has been unable to maintain a navigable channel. At about a mile and a half from the sea the St. George divides into two channels, of which the northern or Kedrilis branch takes nearly 2-3rds of the river in an e.s.e. direction to the sea, and the remainder, or Olinka channel, flows nearly south.

The Sulina, which is the least of the branches of the Danube, conveying as it does only 2-27ths of the main river to the sea, has nevertheless, up to the present time, maintained the deepest channel through the bar by which the sea strives to continue the line of coast.

The course of this branch is, however, such as to hinder very much its navigation, either by sailing or steam vessels. Immediately at the point where it leaves the St. George (called the

St. George Chatal) it makes such a sudden curve as to form a very acute angle with the main stream above; the sand banks formed at the apex of this angle and on the opposite point render the passage between the Sulina and the Toultscha branch, either up or down, exceedingly difficult at all times. From the St. George Chatal until within 25 miles of the embouchure, the bed of the Sulina is obstructed by eight principal shoals, which either reduce the depth, right across, to only 9 feet, or narrow the channel to such an extent as to cause frequent damage and delays in the navigation.

Mention must not be omitted of an insignificant stream, called the Chouga, which connects the Kilia with the Sulina.

The branches of the Delta and the Chouga form three principal islands, namely, between the Kilia and Toultscha branches that of Chatal, between the Sulina and Kilia that of Leti, and between the Sulina and St. George that of St. George.

Below Galatz the banks of the river present nearly the same features as above that town, with the exceptions that will be noticed.

Its immediate banks are, for the most part, low, being somewhat higher than the level of ordinary floods, but decidedly above the level of the marsh land, extending from the river to the steppe on the left bank, and to the Dobrudscha Mountains on the right.

These marshes are covered with high reeds, except where extensive lakes stretch inland. These lakes are fed by the river itself, which finds its way to them through frequent breaks in the banks, which, as has been intimated, form, as it were, low ridges between the river and the marshes.

In times of extraordinary floods, which happen about once in five or six years, the river overflows these banks and, joining the lakes, covers the broad valley through which the river flows. According to information obtained from old inhabitants in the country, it would seem that this inundation does not extend over the whole Delta to the sea, but that the channels of the river are sufficient lower down to carry off the surplus water.

During the two years, however, that reliable, continuous observations have been made in the Delta of the Danube under the orders of the European Commission, no extraordinary floods, and consequently no extensive inundations, have occurred; and such is the vagueness with which those best acquainted with the country give their information, that little value is to be attached to it.

It is to be hoped that future years will afford opportunities for observing and recording all details that are now wanting concerning extraordinary floods.

The exceptions to the formation of the banks above mentioned

are to be found principally on the right bank, where, at many points, the spurs of the Dobrudscha or Babadagh Mountains approach the river and form its bank. This continues down the St. George to within 30 miles of the coast, and at the point where the range terminates it will furnish a good quarry of hard limestone, whence a good supply of rubble can be obtained.

On the left bank of the main stream and of the Kilia branch the "Steppe" also occasionally touches the river, though not so frequently as the rocky hills do on the other side.

The Delta generally is covered with a dense mass of reeds from 10 to 12 feet high, but there are also on the more elevated parts of the St. George and Leti Islands forests of ash and stunted oak, which latter furnish excellent timber for ship building; and the banks of the St. George and Kilia abound in many places with willows of large growth.

The banks at the mouth of the Sulina are covered with reeds for miles inland, but near the basin of Wilkovi, and the mouth of the St. George, there are tracts of pasture-land of some extent, and at these parts the level is higher, though the soil is more sandy than in the parts covered with reeds.

The data upon which to form a judgment of the growth of the Delta of the Danube are not so extensive as could be wished, but happily they are sufficiently accurate for the measurement of the progress of the northern portion of the Delta; that of the southern part can only be inferred.

A map of the Principalities made in 1769 to illustrate the campaign made by Russian armies in that year, shows the Kilia debouching in one mouth at the point where we now find the Wilkovi basin. There is good reason to believe that this is correct, for there exists to this day a range of sand hills, similar to those now found near the coast, and which were in all probability the coast boundary at that time.

Another Russian plan without date, but giving the city of Odessa, which was built in 1796, shows the mouth of the Kilia at the same point, but indicates the commencement of a formation of islands in front of it, which seem to have given rise to the form of the Kilia Delta.

From this old embouchure to the present coast line of the Delta is a distance of 5 miles, which may be taken as the advance of the Delta, certainly since 1769, and probably during the last sixty years.

In the years 1829-30 a detailed survey of this coast, so far south as Sulina, was made by the Russian Government, and furnishes a certain basis from which may be calculated the advance of the Delta between that period and the year 1857, when the coast was again surveyed by the officers of H.M.S. *Medina* under

the orders of Captain Spratt, R.N. A comparison between the two surveys shows that in twenty-seven years the Kilia Delta has advanced more than 4000 feet; that the line of 4 feet soundings has advanced 4695 feet to the east, and 5754 feet to the south; and that the Massurah Point has also advanced 2250 feet to the south.

This comparison shows the possibility and probability of the great growth since 1796, because, as the arc of the Delta becomes longer, its advance eastward is naturally at a slower rate.

If the old charts, just quoted, are also correct in all their details, the changes in the course of the river from Galatz to the sea must have been very marvellous. It seems, however, probable that the river in those charts was laid down from a bird's-eye view; and if at that time the river had inundated its banks, it would have presented very much the appearance given to it, without giving rise to the supposition that any very remarkable changes have taken place in its course.

Both the old chart of 1769, and that subsequent to 1796, represent the Sulina as a stream of great magnitude. This may arise from its having been the only navigable entry. At all events the correct charts of 1830 show it in very much the same condition as at present, as regards size and position. A remarkable change has, however, taken place in the basin into which it discharges, which cannot be attributed to its own unaided action, but should probably be assigned to the adjacent mouths of the Kilia.

The Sulina bar is now very much in the same position as it was in 1830: the coast line to the north of it instead of advancing has somewhat receded, although to the south it has gained, and is *daily* gaining, on the sea. But in 1830 the 30 feet line of soundings was very close to the bar, resembling very much the present condition of the soundings off the mouth of the Ochakoff branch of the Kilia; whereas in 1857 the 30 feet line was 3200 feet more to seaward, the 20 feet line 1400 feet, and the 12 feet line 450 feet farther out.

These facts draw their significance from the farther one that the prevailing wind and littoral current are from north to south. Thus, during the greater part of the year, the river current is turned southwards, and its deposits, as is the case with the other branches, are found to the south.

Whence, then, has the great filling up to the north and east of the Sulina arisen?

Regarding the rapid southerly advance of the Kilia Delta, the direction of the prevailing wind and littoral current, and the proximity of the Sulina to the southern branches of the Kilia, it seems highly probable that the filling up is due to the deposits of the Kilia, rather than to those of the Sulina itself.

At the mouth of the St. George there would not seem to have been so rapid an advance eastward as at the other embouchures, but the absence of detailed plans of this part of the coast, of earlier date than 1856, prevents such a comparison as has been made of the other mouths.

The general position of this mouth, however, shows that the delta does not advance so rapidly as the northern and central parts, and at the same time the greater depths in front of it show that a filling up from the deposits of the northern branches is *not* taking place.

Farther, the existence of the sandbanks south of the mouth shows that the effect of the prevailing northerly winds and of the littoral current has been to turn the river current and its deposits southwards, and thus the principal channel over the bar has obtained an easterly direction.

An examination of the Black Sea will show that in the small angle formed by the peninsula of the Crimea with its western shore, four large rivers discharge their waters into the sea to the northward of the St. George, namely, the Dnieper, Bug, Dniester, and Kilia, or largest branch of the Danube. The waters of these rivers form a littoral current, which, pressed by the prevailing winds against the coast, seeks to escape round the promontory off the mouth of the St. George, and thus produces the rapid declivity which the soundings show at that point. Thence the current passes down the coast to seek an outlet by the Bosphorus, through which, as is well known, there is a very rapid and constant current from north to south, except after a long succession of southerly winds.

The velocity of the littoral current has never been measured during a perfect calm. It varies with the direction and force of the wind from half a knot an hour to one knot and upwards.

The only observation of it during a perfect calm was furnished during last winter in the following manner :—

Two vessels were descried from the Sulina light-house off the Kilia in the drift ice ; there was no wind, and their sails hung to the masts : by evening they were nearly out of sight to the southward, as the days could not then have been more than ten hours long ; and these vessels must have been drifted fifteen miles by the current : the latter would seem to have had a velocity of  $1\frac{1}{2}$  miles per hour at that time, though it is not usual to calculate it at more than one knot.

The following statistics are taken from the excellent Report of Mr. Hartley, Civil Engineer, and Engineer-in-chief to the European Commission of the Danube.

At a time of ordinary flood, in May—June, 1857, the following quantities were measured in the different branches of the river :—

	Cubic feet per minute.
Main Stream above Ismail Chatal .. .. .	19,522,000
Kilia Branch .. .. .	12,041,000
Toultcha Branch .. .. .	7,309,000
St. George Branch .. .. .	5,771,000
Sulina Branch .. .. .	1,446,000

Again, the measurement of the various branches at their mouths gave the following:—

## KILIA.

	Cubic feet per minute.
Stamboul Branch .. .. .	6,242,000
Ochakoff .. .. .	3,050,000
Peschana .. .. .	1,849,500
Ankodinovo .. .. .	182,500
Bolgrad .. .. .	107,000
Total .. .. .	11,431,000

## ST. GEORGE.

	Cubic feet per minute.
Kedrilis Branch .. .. .	3,890,000
Olinka .. .. .	2,000,000

These floods lasted for about three months; after their subsidence the Sulina was gauged, and the discharge was found to be only 561,100 cubic feet per minute, instead of 1,446,000, or a little more than a third. It is probable the discharge of the other branches had diminished in the same proportion.

“The result of several experiments to ascertain the comparative amount of deposit held in suspension at times of ordinary summer-floods, and when the river has diminished to an average flow, showed that the mean bulk of sedimentary matter, when solidified into coherent earth, is about  $\frac{1}{100}$  parts of the volume of water in which it is suspended at the former period, and about  $\frac{1}{1000}$  at the latter.”

The surface of the Delta falls to the sea at a slope of about five inches to a mile.

The inclination of the surface of the river varies considerably, and of course its velocity changes accordingly.

During ordinary spring and summer floods the waters of the Sulina have an average fall of 3 inches in the mile, and velocity of  $2\frac{1}{2}$  miles per hour. When the waters are low, their fall barely exceeds  $1\frac{1}{2}$  inches per mile, and their velocity one mile per hour.

The direction and force of the wind exercise an important influence upon the growth of the Delta.

No measurements of the wind's force have yet been made by means of correct instruments for that purpose, but experience has shown that the most violent and longest of duration are from the N. to N.E. Storms from the E. and S.E. generally veer to the N.E.

The recorded observations from December 1856, to September

1858, show that winds from the northward, *i.e.* from N.W. to N.E., were equal in frequency to winds from all other points of the compass; that of these latter, two-thirds were from the westward and southward, or from N.W. to S., which winds blew with little force, and that only the remaining one-sixth of all the winds recorded blew from the eastward and southward, or from points between E. and S.S.E. Thus, during only one-sixth part of the period named was the littoral current actually checked; during one-third of the period it was pushed away from the coast; and during half of the time it was accelerated and pressed against and along the coast by the most violent and lasting of the winds.

These points have been thus put forward because they seem to throw light on the formation of the Delta.

It would be useful to examine what bearing they have on the means to be attempted for deepening the entry.

Two systems have been proposed for effecting this object at the mouth of the St. George. One is, to carry out piers in a direction E. by S. in continuation of the Kedrilis or northern channel, to a depth of 20 or 25 feet, so as to lead the river current through and beyond the bar to a point where the breakers will not cause it to re-form.

The other system is to cut a lateral canal from the deep channel of the river to a point 1000 yards north of the Kedrilis embouchure, where a small artificial harbour shall be constructed to receive it. The entry to the canal from the river to be closed by two sets of gates to prevent the muddy river-water from passing into the canal.

The advocates of the latter system argue that no other means are possible, as they are of opinion that shortly after the piers of the former system shall have enabled the river to cut a channel for itself through the present bar, a new bar will form in front of the piers at about 1000 yards from them, as they assert that the river will throw down the matters held in suspension so soon as the velocity is checked by the inert mass of the sea, and that thus the piers will fail to produce any permanent effect.

On the other hand, the advocates of the piers contend that as the river will not meet a quiescent mass, but one moving generally at the rate of a mile an hour from N. to S., its deposits will be thrown down to the south of the entry, and they appeal to the position of the present sand-banks in support of their argument.

They moreover urge that the bar is not altogether due to the deposits of the river, for although at the time of a heavy land-flood the bar rises in height, this additional deposit is soon swept away, and the bar remains generally at the same distance from the shore, and is not constantly growing to seaward, as would be the case if the river was daily adding to it.



The bar would seem rather to be due to the action of the waves which strive to continue the line of coast. The river bears its mud far out to sea, leaving the coarser particles near the coast. The waves beat these up and mix with them shells and other productions of the sea. The bar is formed where the waves break on the coast and struggle to stop the river current.

If this current is carried out into the deep water, the supporters of the pier system expect that the bar will not re-form until the general line of coast shall have advanced so far that the breakers again begin to beat upon the shore in front of the current, and when that takes place the piers must be prolonged.

The advance of the coast at the mouth of the St. George has always been slower than on the northern and central portion of the Delta, which is considered to be due to the strong action of the littoral current at this point. It is expected that for a long course of years this current will keep the mouth of the piers free from obstruction by a new bar.

The navigation of the Danube numbers at present rather more, on an average, than 2000 vessels a year, having a burden of nearly 500,000 tons.

The greater part of these vessels enter in ballast, and load with corn, principally Indian corn. Wheat and other grain, horns, timber, hides, tallow, and salt are also exported.

The timber, a soft pine, is rafted down from the Carpathian Mountains to Galatz, whence it is either shipped or formed into much larger rafts for towing to the Bosphorus.

In Bulgaria there is abundance of oak of a description well suited for ship-building, but the Turks will not allow it to be cut for sale; although the forests are seriously injured to a large extent by the peasants, who may cut down the finest trees at their pleasure for firewood, a licence which they abuse most wantonly. The Turkish law relative to oak timber acts very detrimentally upon ships frequenting the Danube, as they have difficulty and are put to immense expense in procuring hard timber for repairs, although abundance is close to them.

The Danube and neighbouring lakes abound in fish of various kinds, of which the sturgeon or *maron* is especially fine. Large quantities are taken yearly, from which excellent caviar and oil are obtained; the flesh is salted down.

The fisheries are farmed by the Government to individuals who have the exclusive right to fish.

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XV.—*Notes of a Voyage to New Guinea.* By ALFRED R. WALLACE, Esq., F.R.G.S.

*Read, June 27, 1859.*

HAVING been for three months the sole European inhabitant of the vast island of New Guinea, I trust a few notes of my visit may prove interesting, in the absence of much definite information as to that remote and imperfectly known country. Even at Macassar, Amboyna, and Ternate, whence a considerable trade is carried on with the north-western coasts and adjacent islands, I could learn nothing, except about one or two spots which had been visited by my informants; and even as regards them, the points on which I was most interested had seldom been inquired into. I was led to believe there were *several* places where the natives had been sufficiently in communication with Mahomedan and European traders to render it safe to reside among them. I have now ascertained, however, that there is on the main land only *one* such place, viz., *Dorey*; where more than thirty years ago the inhabitants were found by Lesson and Duperrey to be quiet and inoffensive. According to the best information I have been able to obtain, there are at the present time absolutely no other inhabitants than the native Papuans over the whole of this great island. Not a single Malay, or Bugis, or Ceramese settlement exists, though *several* are scattered over the outlying islands; the principal being at Salwatty, a large island, forming the apparent north-west extremity of New Guinea, from which it is separated by a very narrow strait. The statement often found on maps that New Guinea is "inhabited by Papuans and Malays," is therefore incorrect.

The whole northern peninsula of New Guinea, as well as the islands of Wagion, Salwatty, and Balauta, are exceedingly rugged and mountainous. There is a continued succession of jagged and angular ranges of hills, and everywhere behind them, ridge beyond ridge stretch far away into the interior. Over the whole country spreads an unvarying forest, of a somewhat stunted appearance, broken only by the very widely-scattered clearings of the natives on the lower slopes. Near Dorey the loftier mountains retire a little backward, and seem to reach their greatest altitude in the Arfak range, which the officers of the *Coquille* ascertained to have an elevation of 9500 feet. Dorey harbour, or bay, is formed by a long, low promontory, curving round towards the Arfak range, which rises abruptly from the opposite side of the bay. Towards the extremity of this promontory is situated the village of Dorey, and opposite, at about a mile, is the inhabited island of Man-sinam, and a smaller one uninhabited. At the village of Dorey I built a rough jungle-house, in which I resided for three months,

occupying myself (in the intervals of fever) with exploring the natural history of the surrounding district.

The Dorey promontory is a raised coral reef, and, geologically speaking, a very recent one. The beach is a mass of dead and broken coral, not yet ground into sand, and quite impracticable for walking; and from this beach up into the jungle, and even on to the hill, to the height of 200 or 300 feet, there is scarcely a perceptible change in the coral rock, and the masses of coral and shells that everywhere strew the surface. In some of the gulleys, however, I found traces of a core of stratified rock. During my whole stay at this place rain was the rule, sunshine the exception. On half the days there was heavy rain, on half the remainder a continual drizzle, or intermitting showers, while even on fine days there was often a dull haziness in the atmosphere, very different from our usual notions of the sunshine of the tropics. The last month of my stay should have been the dry season, but, if there was any difference, it was rather wetter and cloudier than before. Neither were the winds any more to be depended on than the weather. According to *theory*, we went in the west moonsoon and came back in the east; but we found the winds directly opposite in both cases, whenever it was not a dead calm, and thus made seventeen and sixteen days' passages of a distance of 500 miles.

The inhabitants of Dorey live always on the coast, or more properly in the sea, as they always build their houses at or below low-water mark, raised on posts, and reached by a rough and tottering causeway from the beach. Of all houses I have yet met with, these are the most wretched. They are very low and long, and the roof is shaped like the bottom of a boat. Old mats, cocoa-nut leaves, broken boats, and bits of board, make a dwelling such as some shipwrecked sailors might hastily set up for a temporary night's shelter, but which it seems hardly credible that any people should contentedly live in. The natives of the interior do not differ perceptibly in physical character, but have a distinct language, and are called "Arfaki" by the Doreyans. Their houses are very similar, but are raised 12 or 15 feet high, on a perfect forest of thin poles, a few of which are put diagonally, and prevent the whole from falling with the first wind. It is singular that these people know the use of diagonal struts, whereas the comparatively civilized Bugis and Macassar-men are quite ignorant of it, their houses being invariably inclined to one side by the prevalent winds, and only kept from falling by the posts being pretty firmly set in the ground, and the building connected with them framed strongly of bamboos. The Doreyans are fishers and traders, the Arfakis are agriculturists. The former catch turtle and tripang, which they sell for beads, knives, and cloth, and purchase of the Arfakis their rice and yams, plantains and bread-

fruits, and numbers of tame cockatoos and lories, which they sell again to the Ternate and Tidore traders. All these natives have the characters of the Papuan race very strongly marked;—the flat forehead, heavy brows, and large nose, with the apex bent downwards, are almost universal, as well as the harsh curly hair, which often forms an enormous stiff mop, and is then highly esteemed. It has, in fact, a very grand and imposing effect. The colour of the skin varies greatly. In general it is a dirty black, or sooty colour, but varies to a fine brown, which is often quite as light as that of the pure Malay races. Skin disease is very common, and in the children scrofulous diseases abound, which are seldom seen in adults; it is probable, therefore, that the former die from neglect. The men wear the ordinary strip of bark cloth, the women generally a Bugis sarong, or any piece of cloth or matting they can obtain. Tattooing is generally practised; slightly by the men, but much more extensively by the women, who usually have the whole chest covered with elegant tracery, following the curves of the bosom. The females, however, are, without exception, the least engaging specimens of the fair sex it has yet been my fortune to meet.

In mental and moral characteristics the Papuans differ remarkably from the Malay races. They are much more impulsive, and do not conceal their emotions and passions. They are inquisitive, talk much and loudly, and laugh boisterously; reminding one of the negro character, as much as of the negro form and aspect. The natives of Dorey are not to be trusted in anything where payment is concerned. If they do not actually steal, it is, I am inclined to think, only from fear of consequences. They are, however, not a fair sample of the New Guinea tribes, having been too much in contact with the lowest class of Mahomedan traders, with whom they find it necessary to take every advantage in self-defence. They possess the rude artistic genius of so many of the Oceanic tribes, decorating their household utensils and the prows of their canoes with elaborate carving, and the posts of their council-house with obscene caryatides.

The language of the Doreyans resembles that of the Aru and Ke Islands in containing a large number of monosyllabic words, as well as others excessively polysyllabic, offering a remarkable contrast to the striking dissyllabic character of the whole Malayan group of languages. It exhibits also the Polynesian characteristic of several distinct terms for certain objects according to the prefixed pronoun; thus, "my head," "your head," "his head," are expressed by three distinct words. This language, or mutually intelligible forms of it, is spoken by the coast-dwellers over an extensive area—at Amberbaki, 100 miles west, in the islands of Wagion, Myfor, Jobie, and Mysory—and at Amberpoea and some

other islands in the great bay, the natives can converse with those of Dorey, and seem very similar to them in appearance and habits. They are evidently a wandering race, answering to the Bajees, or sea gipsies, of the Indian Archipelago.

I found Dorey very unhealthy, and altogether a very disagreeable place to stay at, but I was obliged to remain till a schooner trading farther east returned to Ternate. Fevers, remittent and intermittent, with dysentery, were very prevalent, and after the first fortnight I generally had two and often three of my servants ill at the same time. One died of dysentery, and I was myself ill at least half the time of my residence in New Guinea. Neither was I rewarded by great success in my researches; on the contrary I found Dorey a very bad locality; the low grounds a quagmire, the hills rugged and impracticable, while the principal objects of my search, the rarer species of Paradise-birds, were not to be found. M. Lesson had obtained quantities of native specimens, but now even of these none were to be obtained.

The principal article of trade on the northern coast of New Guinea is a fragrant aromatic bark, called *mussoey*, which is carried to Java, where the natives extract an oil of great reputed efficacy as a remedy for various disorders. This is obtained only at one locality, Wandammen, deep in the great bay. Besides this, tortoise-shell is an important article of trade, with a small quantity of beche-de-mer and sago. Wild nutmegs are also plentiful, and in the district about Macluer Inlet a small schooner obtains an annual cargo.

The Dutch Government have taken possession of New Guinea up to the meridian of  $141^{\circ}$  east of Greenwich. This claim is often looked upon in England as a kind of usurpation, but persons so viewing it are not probably aware, that along nearly the whole of the coasts included within the northern and southern extremities of this line, an extensive trade is carried on exclusively in vessels sailing from various ports of the Moluccas and carrying the Dutch flag. Considerable portions also of this extensive line of coast have been, or are being, surveyed by the Dutch Government; and instead of cavilling at their claiming so much, it seems more reasonable to admire their moderation in not claiming the whole of a country with which they are so intimately connected. Should the Royal Geographical Society's collection not yet contain them, I may take this opportunity of calling attention to a very beautiful series of maps of the Dutch possessions in the East, by Baron Melvill van Carnbée.

On the small island of Mausinaru, opposite Dorey, have been residing for about three years two German missionaries. I fear, however, that in the Doreyans they have very impracticable materials to work on, and I am afraid they neither have made nor

will make much impression. From the little I have seen of the Dutch missionary system in these countries, I am bound to declare my opinion that it is altogether wrong in principle. I allude to the custom of the missionaries being also *traders*. In the island of Lombock, during my stay there, two gentlemen were employed in winding up the affairs of one of these trading missionaries, who had failed to the amount of some 20,000 dollars. He was despised for his ignorance and incapacity in business by the acute Chinese and native traders, and was therefore in a decidedly false position when attempting to teach them. It seems to me that a man in trade (especially in these countries) attempting to teach Christianity is in a terrible dilemma. To make his trade profitable, he must drive hard bargains, he must take little advantages even of the necessities of his customers and disciples, and thereby stultifies his own teaching of unselfishness and charity. If he does not do this, he cannot live. The best and most effective missionary system I have seen is certainly that of the French Jesuits in the Straits, in Siam and in China, because by living in poverty, and establishing an almost entire community of property between the teacher and his disciples, they prove convincingly that their sole object is the benefit of their flock. Whatever the doctrines taught may be, the method of teaching is certainly admirable.

When in Amboyna, in January last, I heard that an exploring expedition was decided on to fix upon some place on the coast of New Guinea for a settlement. A war steamer and a sailing vessel, carrying troops and stores, left that port in March, and commenced their exploration on the south-west coast, near the Utanata river, from which place to the island of Lakahia they made a detailed survey. They then came round to Dorey, where they arrived on the 5th of May. A few days before a coal-ship from Banjarmassin, in Borneo, had left for Amboyna, having stayed in Dorey harbour two months, waiting for the steamer's arrival. The captain told us his agreement was to return on a fixed day, which was some days past when he left. The steamer was nearly out of coal, and could neither go on nor go back. It lay a month in Dorey, and the soldiers, firemen, &c., were kept hard at work cutting down and sawing up huge trees for fire-wood. This was all done and all got on board, and the steamer was to leave for Amboyna the next day, when back came the coal-ship. Now out went the wood again, and the coal being taken in, the steamer went off to Humboldt Bay, where they stayed a few days, opening a communication with the natives, who are quite unsophisticated, but superior morally and physically to the Doreyans. The plan of the original expedition was to explore the whole coast on their return, but they were short of provisions, and went straight back to Amboyna. The results of this voyage were not very great, and

it may probably be resumed next year. The captain informed me that a recommendation would be given to establish a military post at Dorey, which he had no doubt would be done. As a place for a settlement it is in every respect bad; the soil is not good, there is little water, and the natives of the interior are few, scattered, and hostile. It is, however, the only harbour for whalers or China ships after passing Pitt Straits into the Pacific, and it is this circumstance which decided the recommendation for an establishment.

This is the latest news from New Guinea. I shall not probably myself visit the main land again, but hope in the next year or two to be able to reach Wagion, Salwatty, and the little-known island of Mysool.

XVI.—*Travels in Siam and Cambodia.* By D. O. KING, Esq.

*Reul, June 27, 1859.*

*To the Secretary of the Royal Geographical Society of London.*

Newport, Rhode Island, February 7th, 1859.

SIR,—Six months ago I returned to the city of Bangkok, in Siam, after nearly a year spent in travelling the unknown lands of Eastern Siam and Cambodia; and, at the suggestion of Sir Robert Schomburgk, H. B. M.'s Consul, I beg to hand you herewith a copy of the map of my travels, sufficiently interesting, I trust, to warrant its reception at your hands.

With the exception of M. de Pallegoix's account of these countries, nothing has hitherto been published respecting them worthy of any confidence; and of the interior, beyond the city of Bangkok, the fanciful accounts of the natives served merely to excite a curiosity that a foreigner was unable to gratify. Permitted at last to investigate for ourselves, I became acquainted with Eastern Siam, and what is left of the old kingdom of Cambodia; and although the many reported marvels in botany and natural history were successively followed up until they were proved fables, still the geographical features of a new country are always of interest, and a few general remarks respecting them may not be unacceptable.

The eastern shore of the Gulf of Siam stretches from Bangkok to Chantiboon, and beyond Kampoot; but the lofty range of mountains along the coast impedes communication, and the Petrio canal is exclusively used by travellers to or from the eastern provinces. This canal, 55 miles long, connects the city of Bangkok with the Bang Pa Kong river, and is made through a flat, alluvial country, entirely devoted to the culture of rice. The natives, like

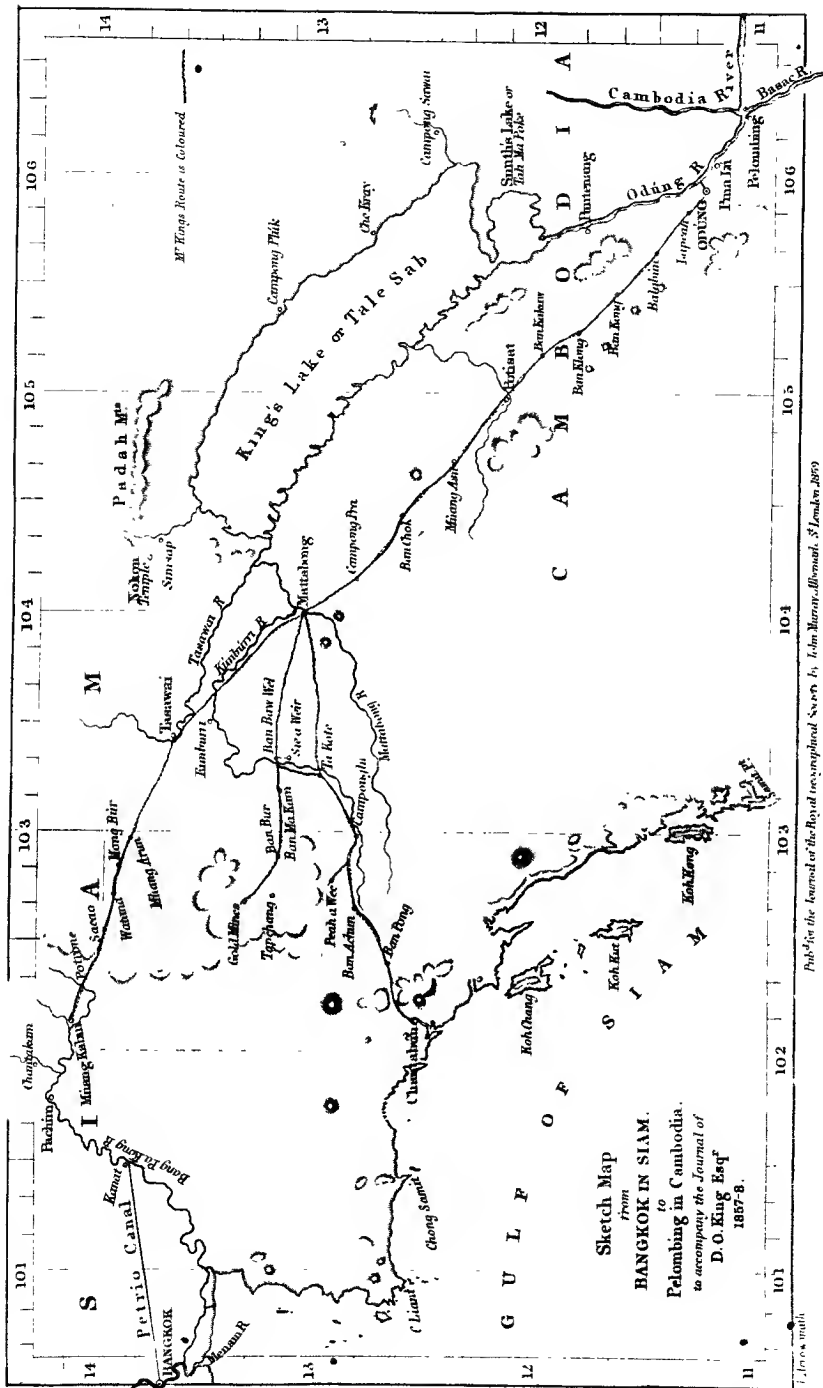
the rest of the Siamese, appear to be a branch of the Malay family; the floors of their bamboo-thatched houses are raised some 4 feet from the ground; their clothing simply a cloth round the waist; and, whatever they may be engaged in, one hand is generally actively employed warring against the swarms of mosquitoes.

The canal joins the Bang Pa Kong river 20 miles from the mouth of the latter. This river, as you ascend, becomes narrow and winding; cultivation is restricted to a strip of land on either bank at first, and then occurs only at intervals; the inhabitants are few and poor, and nothing that can be called a village is met with until you arrive at Pachim. Here, and elsewhere in Siam, the traveller is struck by the immense tracts of land lying idle for the want of a labouring population: emigration from China would soon remedy the evil; but the Siamese rulers dread the introduction of any number of coolies, and restrict their importation.

Pachim is the residence of a governor of a province, and the traveller must land and show his passport: the officials are invariably civil and obliging, provided your passport comes from their superior in rank; and custom, among themselves, obliges the foreigner to offer a small present before leaving. The town of Pachim consists of some twenty bamboo houses, and was entirely destroyed two years since, a fire from the prairie consuming crops and all. The river here is about 40 yards wide, and during the rainy season, from July to November, runs out at the rate of 5 miles per hour. During the rest of the year there is a regular rise and fall of the tide here, and its influence is felt up to Kabin. Leaving Pachim, the navigation of the river is tedious, being against a strong current, in the wet season, after which the river rapidly falls, and the channel is narrow and full of obstructions. An occasional glimpse of the mountains far off to the east and north is obtained, but the country along the river maintains its level character, and generally is densely wooded.

Twenty years ago, during a war with the Cochin Chinese, a military road was constructed from the town of Mooang Kabin across to the Tasawai river; and although the bridges have disappeared, and the road is a mere wreck, still it is the only route across the country. Merchandise is conveyed in small but neatly-covered carts drawn by a pair of buffaloes; travellers using elephants; and from this point over to the confines of Cochin China these latter animals occupy the place the horse does with us. They are large, docile, and well trained, and are cheaper than anywhere else in the world, a full-grown animal being worth from 50 to 75 dollars. About two-thirds of the males are provided with tusks; and in buying and selling the natives appear to think nothing of the value of the ivory. Ten miles south-east







from Kabin I visited a spot on the bank of the river, where a number of natives were sinking shafts in search of gold : from all I could learn, but little had ever been found, and of late scarcely any.

Elephant-travelling over the military road is tedious and uninteresting. During the rainy season the streams are so swollen that the road is never traversed if it can be avoided ; and the want of water in the dry season is an ever present evil. The elephants soon become footsore and sick if pushed beyond 25 miles per day. Travellers are rarely met with ; and solitary houses, 20 miles apart, only relieve the weariness of the route. One day's journey from Kabin the road winds around the base of a mountain, but with this exception it is all a prairie—across to Tasawai occasionally broken and rolling, and then stretching for miles as smooth as a floor. The soil is of red sand, and the trees twisted and dwarfed in a manner I could never account for, until, caught, upon one occasion, by the fire that annually sweeps over these plains, among them, I had an opportunity of seeing how the young trees were parched and shrivelled by it. Bog-iron, which occurs frequently, is the only metal to be found on the road.

The provincial town of Mattabong is situated on both sides of a river of that name, in the centre of a large plain. The country, for nearly 100 miles around it, is flooded with water soon after the commencement of the rains ; travelling becomes impossible, except in boats, and wild animals are driven off to the mountains. The existence of a large lake to the eastward has been reported to foreigners ever since their residence in Siam ; and in the map accompanying M. de Pallegoix's work it is incorrectly inserted. The native accounts of its size were found to be not far from the truth ; and I passed completely round the shores, everywhere being pleasantly diversified with forest and open prairie. The natives hold the lake in a sort of superstitious fear, its rough waves causing many accidents to their small canoes ; and squalls and waterspouts are of frequent occurrence. During the months of January, February, and March, when the water has drained off the surrounding country, the lake appears alive with fish, and the inhabitants collect large quantities of them. From September to December the banks are overflowed from 10 to 20 feet deep. In the lake we failed to get bottom at 10 fathoms. At the close of the dry season, in May, frequent shoals occur in its bed, and a boat drawing 2 feet of water is all its shallowness will allow.

At the northern extremity of the lake, in the vicinity of Simsap, was situated the ancient capital of Cambodia, no trace of which now remains, except in the Nokon temple, spared from destruction when the city was taken by the Cochin Chinese about A.D. 200. The temple stands solitary and alone in the jungle, in too perfect

order to be called a ruin, a relic of a race far ahead of the present in all the arts and sciences. A magnificent stone causeway, a third of a mile long, leads through an ornamental entrance up to the temple, composed of three quadrangles, one within, and raised above the other; the lower quadrangle is 200 yards square, a broad verandah with a double row of square ornamented pillars running all round, with large and elaborately ornamented entrances at the corners and centres. It is built of a hard grey sandstone, without wood, cement, or iron in its composition, the blocks of stone fitting to each other with wonderful precision; and the whole temple, within and without, covered with carefully executed bas-reliefs of Buddhist idols. A few priests reside outside its walls, and the place is visited as a shrine by the Cambodians. On the eastern verandah a square tablet of black marble has been let into the wall covered with writing, and doubtless setting forth the main facts in the raising of the temple. The characters used are precisely similar to the present Cambodian alphabet, but so much has the use of the letters changed, that the present race cannot decipher it.

The Oodong river issues from the south end of Smith's Lake, and is throughout a broad, majestic stream. The town of Poon-tenang supplies the whole country with pottery, and from there to Oodoong scarcely a sign of human life is to be found. This city (Oodoong) is the present capital of Cambodia, the former city having been completely destroyed by the Cochin Chinese 15 years ago. A wooden palisade, 20 feet high and 600 yards square, encloses a straggling collection of thatched houses, the residences of the nobles, in the centre of which a low brick-wall encloses the palace, mint, and arsenal. Everything bespeaks poverty and the recent ravages of war, but nothing could exceed the friendliness of the welcome extended to us by the King, and we were assured that foreign travellers would be granted every facility.

On the river below Oodoong the Roman Catholics have a mission establishment at Pina Loo, where we found a bishop and one priest; and, descending the river, stopped at Pelomping, a town on the borders of Cochin China. This is a place of some little trade, raw silk, iron, dried fish, &c., being brought here from the Cambodia river, but the crowds of Cochin Chinese in the streets manifest anything but kind feelings: from a hill in the rear of the town the farther course of the river, as shown in my map, was noted, the Cambodia river here turning at a right angle to the eastward, with a breadth not less than 2 miles.

The elephant-road from Oodoong to Mattabong, like the rest of the roads, is only available during the dry season, and as far as Potisat winds through a hilly region. Near this town a large deposit of antimony is found, and also quarries of Oriental alabaster. The journey from Mattabong to the coast at Chantiboon

usually occupied 6 days, the crossing of the coast range of mountains causing some delay, and affording nothing in scenery in return.

The botany and natural history of this region, so far as I could judge, afford nothing new or strange. The annual overflow of the plains is favourable to nothing except aquatic plants, and the waterlily is common everywhere. In addition to the white and purple lilies, and the common lotus, a bright cherry-coloured variety is found at Simsap. At Penet Pra a lily was said to exist surpassing in size and beauty the *Victoria Regia*; it was not in flower at the time of my visit, and the leaf of the plant was similar to the lotus. The cork-tree, wild nutmeg, licorice, and several varieties of India-rubber and gutta-percha are met with in the mountains, but not in sufficient quantities to be of commercial value. My endeavours to meet with the tree producing the gamboge-gum were unsuccessful, it only being found in the mountainous region between Chantiboon and Kampoot.

The wild animals of the country are not so numerous as might be supposed; the natives say that 20 years ago an epidemic swept off immense numbers of them; and though tracks of deer, buffalo, wild cattle, and pigs are often seen, the animals are few and wild, and seldom met with. The wild elephant and rhinoceros are found in remote districts, and the tiger and leopard are heard of occasionally everywhere. The natives hold these last in but little fear, saying they have never been known to attack any one that faced them. This country has long enjoyed a reputation for abounding in reptiles that does not belong to it. The skins of anacondas offered at Bangkok come from the northern provinces, and in all my travels I never saw but four snakes, all small. The annoyances of travel are caused by smaller specimens of animal life. Ticks are common, and require constant care; mosquitoes are often very troublesome; and swarms of large horse-flies, that bring blood through an elephant's skin, sometimes drive men and animals almost wild. But the greatest nuisance are the ground-leeches. The first shower of the rainy season brings into life a crop of leeches that grow to some three inches long, and infest the face of the earth. Warned by the rustle of the leaves, or the jar of the ground, of the approach of something living, they erect themselves on one end in the pathway, and swing round and round, trying to cling to what is passing by; halt in the path, and you can see them coming in hurried spans from all sides; drive your pantaloons inside your boots, and they climb up and get down your neck. To sleep in the open air is impossible, as they rest not at night, and animals of all sorts are covered with them.

The birds of the country are mostly of the wading species. Pelicans and ducks are common, but the adjutants and birds of

the crane family are innumerable. Eagles and vultures are commonly found in the vicinity of carrion, and the shoehorn-bird of Sumatra is occasionally met with in the forest.

So far as my experience goes, this land is poor in minerals. A little gold is obtained, but iron is the only thing found in any quantity; no trace of coal anywhere. The mountainous region along the coast is doubtless richer, but is at present unknown.

With these remarks I commend the accompanying map to your attention, and remain

Your obedient servant,

D. O. KING.

XVII.—*Notes on the Antiquities, Natural History, &c. &c., of Cambodia, compiled from Manuscripts of the late E. F. J. FORREST, Esq., and from information derived from the Rev. Dr. HOUSE, &c. &c. By JAMES CAMPBELL, Esq., Surgeon R.N., F.R.G.S.*

*Read, June 27, 1859.*

IN modern Cambodia, or Kamen, as it is called by the natives, the remnant of a once powerful kingdom extending from the Bay of Bengal on the west, to the confines of China on the north and east, there are several objects of interest to the geographer, naturalist, and antiquary; and though the present essay at unfolding these to the Western world is one confessedly meagre, yet it is forwarded as an earnest of the wish and intention of the late inditer of the principal items herein contained to do what he could for the elucidation of many topics relating to this effete kingdom, and which, it is to be regretted, he was not spared to communicate in his own name.

Cambodia was formerly unequally divided into six divisions, viz., Dongnai, Quiduk, Sadek, Metho, Kamao, and Teksea: these, though politically extinct, are still more in the mouths of the people than the new ones, which are named Go-sat-tran, Hateen, Nam-wang, An-giang, Vingh-tan, Dinh-tuong, Phan-yen, and Bien-hoa. The greater part of the kingdom presents a continued flat alluvial soil, plentifully irrigated by rivers, one of which, the Mekom, or Mekong, is one of the largest rivers in Southern Asia. This river, which flows through a rich and varied valley, takes its rise in Yu-nam, on the frontiers of Se-fan, in lat.  $27^{\circ} 20' N.$  It is at first named Lan-tsan, but towards the south, and before it enters the Laos country, it is called Kew-lung-keang, or Nine Dragon River. In Chinese territory it runs a long distance through a magnificent valley. In  $16^{\circ} N.$  lat. it bends more to the east, and enters Cambodia, having previously been augmented by a

large tributary. It then drains the whole length of that country, and falls by three embouchures into the sea in about  $9^{\circ} 34'$  N. lat. In many places the river is very deep, in others there are rocks, cataracts, shifting banks, and shallows, all of which impede navigation. The river is navigable in Yu-nam, and there are many flourishing cities upon it. In Laos many thriving villages adorn its banks, and in Cambodia the principal population is near it. We may conceive what a mighty stream it must be when it traverses eighteen degrees of latitude, and forms at its mouth an alluvial deposit second only to the Yang-tze-kiang, or Whang-ho. There are numerous other rivers in Cambodia. On the frontier of Siam is the Kho River, an insignificant stream, but the boundary between the two countries. On the banks of the Pong-som, likewise styled Cam-pong-som and Vung-tom, there is a considerable trading-place—Vin-tam-phu, principally inhabited by Chinese. The Hatien, or Kang-kau, in lat.  $10^{\circ} 14'$  N., and  $104^{\circ} 55'$  E. long., has a great depth of water; and on its banks there is a flourishing town of the same name, inhabited by many Chinese. This was once a great emporium for the whole Cambodian trade, and known to Europeans under the names of Pon-tea-mas and Potai-mat, a name now obliterated from the maps. While civil strife in the interior occupied the attention of the king, a man of Chinese origin availed himself of the opportunity to declare it a free port, and thousands of merchants established themselves there in a few years. The place speedily increased in wealth, but the envy of the Siamese could not allow them to rest, and the emporium was destroyed in 1717. Kangkao, which took its place, is still a considerable trading station for the exportation of rice and salt, principally for Singapore. The junks which belong to it are very small, as the harbour is shallow. In order to facilitate the intercourse, the Cochin Chinese have again opened the canal which joins the river to the Mekom. The Karmunsa, called Rachgea by the Cochin Chinese, and by the Chinese Teksea, is joined not far from its embouchure by a considerable tributary. It falls into the Gulf of Siam, and has recently been joined by a canal to the Mekom. The Tek-maou, or Black-water River, is in connexion with the Mekom, and disembogues by three embouchures into the sea in lat.  $8^{\circ} 4'$  N., opposite to Pulo Obi. It is a navigable river, and the water is largely used for irrigation.

That part of the kingdom termed Upper Cambodia extends beyond  $11^{\circ}$  N. lat., and comprises nearly  $5^{\circ}$  in breadth, namely, from  $103^{\circ}$  to  $108^{\circ}$  of E. long. It is situated on both sides of the Mekom, extending eastward to the Cochin Chinese range of mountains, and westward to Battabong. This province, ceded to Siam of late, formerly constituted a part of the kingdom; and then the second range of mountains, which issues from Yunam and

traverses the whole peninsula, was the natural western boundary. To the north its confines are marked by the bend of the Mekom, the left bank of which belongs to the Laos tribes.

Of all the cities of Cambodia, Saigon stands foremost. The depth of the river on which it is placed, its vicinity to the sea, and its extensive inland communication, constitute it an important emporium. The entrance is at Kangeo, a miserable fishing village amidst jungle. The country, however, soon afterwards improves. The river continues very deep, and the ascent leads to two of its disemboing branches, both of which fall at a short distance east and west into the sea. The population is here considerable, and several manufactures of coarse silk stuffs are said to exist not far from this. Saigon is about 30 English miles from the sea; but before reaching the town the traveller arrives at Pingeh, the residence of the provincial governor, a city with many new fortifications built after European principles, with arsenals and docks for the supply and building of war-vessels. It has a large population and a considerable trade. Saigon is about 3 miles farther, upon an insignificant branch of the river. Though the principal trading-town, it does not admit but of small vessels. Both towns are intersected by many canals full of boats, like Chinese towns, for many people live constantly on water. The streets are broad and lined with bamboo shops; the Chinese alone have respectable houses. The timber of this district attains a great length, planks being occasionally seen upwards of 100 feet long.

Besides the river and canal communications above referred to, there is another drainage system in Cambodia worthy of special reference, viz., a great inland lake termed Talæ Sap by the inhabitants, but Bien-ho by the Cochin Chinese. It discharges its water into the Mekom, and seems to be the most important and anomalous of the Cambodian affluents which flow into that mighty stream. This lake does not appear in any of the atlases at my command, and though its position is tolerably well defined in the works of Crawford, Pallegoix, and Bowring, none of whom I believe saw the lake—Mr. Forrest visited it at the middle of the dry season—yet, as they do not give any description of it, I append the following.

The lake Talæ Sap is the result of a depressed basin, situated in a very flat country; and hence, from its location in a region of periodical rains, is subject to great alternations in its depth. Occasionally in the dry season it is so shallow that boats require to be poled along instead of pulled; but in the wet season it attains a depth of at least 45 feet, and measures about 100 miles long by 40 at its greatest breadth. It seems remarkably odd that when at its height there is comparatively little surface current, whilst when the waters have somewhat fallen there is a consider-




able flow. There does not appear to be any increase of water at the embouchures of the Mekom, or of the adjacent sea and gulf, as a result of the south-west monsoon, similar to what I have noticed in the Gulf of Guinea during the line westerly monsoon; and as the disemboguing outlets of the Cambodian river system are numerous and unobstructed, the anomaly of such a periodical collection of pent-up water seems truly remarkable. The lake being plentifully supplied with fish, is the seat of an extensive fishery. The taking commences in November and continues till July, when the rising waters compel the fishermen to proceed to Battabong and other places in the vicinity of the lake. The inundation destroys the houses of the fishermen, which, from being of a temporary nature, are constructed of bamboos bound by rattans, and supported by poles at a height of 10 feet or more from the water-level. These huts are thatched with straw, and furnished alone with the most immediate requisites of life and implements of the fishery. When the fish arrive at these depôts they have their heads severed, are split down the belly and flattened out, the entrails and backbone abstracted, and the inside scraped with a clean shell to carry off all blood; two slits are then cut on each side, and after being rubbed with salt and allowed gradually to dry in the sun, they become what the inhabitants style "pla heng," dried fish. They average about 100 to the pical of 133½ lbs., and that weight is generally sold for two ticals, or about 5s. 4d. sterling.

The Chinese go from Battabong, Oodoong, and other places to purchase the fish, and then export them to Cochin China, where they are sold for from three to four ticals per pical. Their supply of salt is obtained principally from Cochin China, but occasionally they fail in procuring it thence, either on account of Government prohibition or otherwise, in which case they resort to Chantiboon for supplies. Fish are principally taken by the seine, but there are an infinity of methods employed for their capture, such as the spear, cast-net, lines, &c. The fishermen are all Cambodians, and their nets nearly surround the lake.

#### ANTIQUITIES.

Situated about 15 miles north of Talæ Sap, hidden in a forest of old growth and great density, stand some of the most interesting relics of antiquity—the ruins of Nakon Wat and Nakon Hluang. Enveloped as are these ruins in the most unfathomable mysteries, unpossessed of any tradition beyond mere conjecture and popular rumour which can throw light on their origin or foundation, and surpassing in splendour of design and beauty of architecture the most renowned remnants of bygone ages to be found in Hindostan, they offer to the student of Asiatic archæology matter for the

most profound research, which it is to be hoped some philo-Asiatic may yet undertake. In truth, Nakon Wat stands like a mighty sphinx frowning contemptuously on the infantine and barbaric state of the arts and science of the people who are now the denizens of the forests and plains in its vicinity, and presents, with its towers and halls so pregnant with mystery and evidences of the past, a wondrous enigma which challenges the wisdom of the world to fathom. A superstition exists in Siam and Cambodia, that should any prince or noble be audacious enough to penetrate into the domains of these ruins they will most assuredly die; and so strong is the belief, that no man of rank has visited them within the memory of the oldest inhabitants of the neighbourhood. There is even a pestilential air pervading the surrounding country, asserted by the natives to cause an amount of sickness quite unusual to any other part of Cambodia, which seems to be a guardian against intrusion on the solitary dignity in which these extensive ruins rear themselves. Standing alone in a country now depopulated and overgrown with forest, wherein not even a house of the smallest description can be found, and constructed of stone, these ruins cannot fail to strike the beholder with the utmost wonder and awe, indicative as they are of an age and people to whose vigour, power, and talent, the present debased and enervated condition of the Cambodian forms a most powerfully painful contrast. Approaching the building from the west, the traveller suddenly sees before him a raised platform of stone, with three flights of five steps leading to its surface. This, although at first sight it appears to stand isolated from any further building, is the end of the elevated road or causeway which conducts to the grand entrance of the temple of Nakon Wat—the Temple of Angels. This terrace is built in the shape of a cross, having on the north, south, and western abutments a flight of five steps, to the east being the road to the gate. At both sides of each flight a colossal lion 8 feet in height, erected on a pedestal, stands sentinel; and at the commencement of the road are two more. The causeway passes over a moat of a breadth of 400 yards, which was doubtless formerly filled with water, though now but a morass. It is raised from the surface of the morass nearly 20 feet, its foundation and body to a height of some 10 feet, by means of large blocks of a coarse conglomerate; the rest, together with the pavement, being of freestone. The masses of stone were invariably of the same dimensions, and were fitted together in this manner



without cement. The entire length of this causeway was 450 yards. At the end of the causeway stands the grand gate, which gives ingress into the grounds of the temple. Over the chief entrance a tower of the most delicately sculptured work rears itself to a height of 60 yards. On each side of this,

at a distance of 60 yards, is a lesser tower of the same style, under which is an inferior entrance. These towers are connected together by a succession of halls or chambers, the interior of which is plain, but the exterior beautifully carved and embellished. From the lesser towers, for a distance of 150 yards, runs a corridor, the arched roof of which is supported invariably by a wall, and externally by a row of square columns. A small gateway, built in the form of a cross, then joins the entrance buildings to the main wall, which is 15 feet high, and about 6 feet thick. This wall is built of the coarse conglomerate before spoken of, and environs the grounds in which stands the temple, its monotonous appearance being relieved by lesser gates, with chambers on each side of them built of freestone, which are to be found midway in the wall on the east, north, and south. After passing through the grand entrance a terraced road, raised a few feet above the level of the gardens, conducts to the main edifice. This road, which is 30 feet broad, had formerly a balustrade paved with lead, the traces of the fastenings of which to the stone are plainly visible; but at the time of the invasion of Cambodia by the Siamese in 1835, the ruthless soldiery added the robbery of this to the list of the damage they did to the temple. At intervals abutments with steps, the sides of which were adorned with *phya naks* and lions, allowed egress from the road to the ground. Halfway between the gateway and temple, on each side of the road, are two small buildings of freestone, which might have been either sacred places or residences for priests; they are now too much blocked up by débris and ruin to admit of inspection. The grounds seem evidently to have been laid out with great care, but now the entire enclosure not occupied by building is covered with dense and impenetrable undergrowth, interspersed with a few large trees. Along the sides of the temple are a large number of palms, mango, and betel trees, the latter of recent growth. In the part of the garden immediately contiguous to the chief doorway of the edifice are two artificial lakes or tanks, one on each side of the road, which were most probably constructed to afford water to the inmates. The chief doorway of the grand edifice is approached from the road by a flight of high steps, fifteen in number, and a short terrace. Taken from the outer gateway, nothing can exceed the magnificence of the *coup d'œil* presented by the noble ruins, and the admiration produced by that unison of all parts; and the beauty of the architecture is doubled when, on arriving in close proximity to the walls, the extreme faultlessness of the design, the delicacy of the workmanship, and the great attention paid to the minutest portions of the construction, are displayed. The Cambodians say that this structure could not have been the work of men, but must have been that of angels. Every

circumstance attendant upon its erection gives countenance to this idea, and in truth a people so little advanced in civilization as they are, have ample reason to be confirmed in this belief. They see here a structure of enormous extent and height, built of a description of stone of which no traces are to be found in the neighbourhood, and which must have been brought from mountains, the nearest of which are at a distance of some days' journey. Again, the huge blocks of stone employed in the building, many of them measuring 18 feet in length, and from 3 to 4 feet in breadth, which, notwithstanding that they are put together without cement, leave scarce a trace of their joinings—the excessive delicacy of the chisellings, the artistic contour of the statues, the peculiarity of the design, and the *tout-ensemble*, so widely different and so incomparably superb to what they have ever seen or heard of elsewhere, cannot fail to inspire them, left, as they are, without legend or tradition to guide them in any way, with the faith that celestial artificers must have been the erectors.

Nakon Wat consists of three divisions rising one above the other, the inner and chief one being a pyramidal-shaped tower rising to a height of 300 feet from the ground; this is surrounded by the second division, a corridor; and this in turn is enclosed by the third division, another corridor. It may be a matter of controversy whether the word corridor is a correct term to be applied to these portions of the building, comprising as they do the whole of the sheltered spaces. The absence of any large halls or chambers is very peculiar, but this can be easily accounted for by the evident ignorance of the builders of the art of arching. The corridors or galleries, having but a breadth of a few feet, are roofed with blocks of stone, the one lapped over the other, the irregularities in the surface being afterwards cut away so as to make it arched. A roof of this description could not, of course, be erected over a space of a much greater breadth; and the impossibility of employing timber without destroying the beauty of the edifice gives an ample reason for the nonformation of chambers of large dimensions. The principal flight of steps leading up to the chief entrance conducts along a succession of chambers and passages, and up various sets of stairs through both the outer divisions or corridors to the tower or sanctum sanctorum, where, after ascending a fine broad flight of steps some sixty feet high, is the seat of the grand idol. The outer corridor contains the most interesting features of the entire building in the shape of the alto-relievos with which its walls are embellished. These extend nearly the whole length of the four sides, and display a vast amount of artistic taste and skill. The figures are carved out of the same stone as the rest of the building, and now present a highly polished surface, though they were formerly richly overlaid

with gold of considerable thickness, traces of which now remain. Notwithstanding the scarcely conceivable age of the work, the walls on which are these admirable representations do not show a crack or a mark of decay; and, with the exception of here and there, where some stone from the roof has fallen in, are totally uninjured. On the western or front side is delineated the scene of a grand engagement between two rival armies, recording evidently events of some period in the history of Cambodia. Among the figures are chiefs riding in chariots drawn by dragons and tigers; generals seated on splendidly caparisoned five-trunked elephants with huge tusks; archers and footmen armed with lances and swords. The two armies, it seemed, had also lions and tigers, dragons and elephants, in their ranks, to whose lot, to judge from the number of slain and wounded near them, the largest part of the fighting fell. The wall of the northern face of the corridor portrayed the order of march of the army. Soldiers and beasts are figured as marching along in well disciplined regularity under the command of chiefs and heroes. Here and there among the ranks a band of musicians is to be seen beating gongs and blowing horns in shape like the tom-toms of the Hindostanees, evidently made from those of the buffalo. The soldiers are well armed with bows and arrows, swords, clubs, and shields, and have among them several men of gigantic stature, some of whom have twenty-four arms. In every scene elephants hold a most prominent place, showing that their employment as agents of warfare must at that period have been very general. On the eastern front of the outer corridor is to be seen a curious representation of two large bodies of men, apparently rival factions, striving to gain possession of a huge serpent which had one coil in the centre of its length round the trunk of a tree. There are two hundred men engaged in the struggle, one-half of whom are pulling on each side of the tree. This has probably some reference to an event in Buddhistical mythology, though the natives interrogated on the subject assure the inquirer that it is only placed there for ornament. The southern side showed a large number of captives in the hands of executioners, who were inflicting on them every variety of the most excruciating torture. In some parts men are figured driving nails into the bodies of unfortunates impaled on a kind of gallows; some are dashing young children against rocks and stones; some are cutting to pieces men and women confined in fetters, or pounding them in mortars; and others are hanging up prisoners to trees by their legs to allow the vultures to attack them. The outer is connected with the inner corridor, which is raised many feet above it, by passages and stairs, the space between the two on the western side being formed into four quadrangles by the passages connecting them together. At the side of one of these

passages, and leading out of it, is a small cell or chamber, designated the gong or bell chamber by the natives from its being constructed in such a way as to cause a heavy sound, like that emitted by a gong, to reverberate around when a person standing therein strikes his breast with his hand or stamps on the floor. Apparently in this room there was formerly placed either a gong or bell, and considerable ingenuity must have been exercised to construct the walls and roof so as to cause the above effect, which would necessarily give extra power to the instrument. A small perforation in the wall, and a channel scooped out in the pavement of the adjoining passage, evidently intended for a wire, show that the instrument contained in the gong chamber could have been struck through the agency of a person in some other part of the building. In a passage or corridor running parallel to that last mentioned, on a pedestal of bricks, stand a large number of images of all sizes and varieties, the remnants of those that once occupied the many altars of the temple. At some recent period they were collected and placed together in their present position by the then resident priests, in order probably that they might be the more easily guarded from the pilfering hands of pilgrim visitors. A large number are cast in bronze and brass, and were formerly thickly overlaid with gold. Others are to be seen carved out of ivory, wood, and stone. All the gold, silver, and agate images, once profusely adorning the building, were carried off by the Siamese soldiery in the war of 1835. In alluding to the depredations committed by the Siamese—so essentially votaries of Buddha—on a temple of their god renowned for its extraordinary sanctity, it cannot fail to be observed, with respect to the religious idolatry of a barbarous people, how unstable are their faith and tenets. In the case of Nakon Wat all the earliest religious associations of the Siamese were derived thence, whilst the books and faith which they at the present day pretend so much to revere, all emanated from this temple, which, on the occasion of the Siamese army marching against Cambodia, a licentious soldiery, not only unrestrained, but by direction of their leaders, despoiled of its gold and wealth, and broke, in their search for hidden treasures, the finest statues and figures, testimony of which is but too plentifully afforded by the *débris* and broken limbs scattered throughout the edifice.

The second corridor lacks the embellishments of the outer one, the walls being left plain. It must, however, formerly have been thickly occupied by idols. The north and south sides are open, the inner windows looking into the paved open space, in the centre of which stands the grand tower—the third division of the temple. This tower rears itself above the level of the second corridor some two hundred feet, and is ascended by means of four superbly wide and four minor flights of steps. The area is divided by galleries

or corridors into four quadrangular open spaces. In the centre, and immediately under the tallest and largest spire, is the seat of the chief idol, whose face looks towards the west. The inner division or grand tower, from, it is to be presumed, its being the sanctum sanctorum and throne of the chief divinity, displays more architectural embellishments and intricate carving than any other part of the building. What is most remarkable, however, not only in the characteristics of the tower, but also in the rest of the building, is the utter absence of any of those absurd images and representations of monsters and fabulous animals with which the numerous temples in Hindostan and Java are so plentifully adorned. The chief god at this temple bears a most sacred character, and is renowned as the most powerful deity in Cambodia. Thousands of pilgrims from all parts of the country flock annually to prostrate themselves before him; but mean must be their worship to the grandeur and solemnity of the ceremonials with which he was wont to be adored in olden times, when kings and princes knelt before him, and thousands of gorgeously robed priests chanted his praises, whilst at the sound of the gong the multitude fell prostrate beyond his presence. Occupying this ancient throne, the god still sits, but has been disrobed of his splendour; where once shone jewels and precious stones, is now the unsightly tarnish of the metal of which his body is composed. Attached to the temple are some three hundred men and women, who are the descendants of the slaves apportioned to the temple at its endowment. Their number was formerly much greater, amounting, it is said, to several thousands, but they now decrease almost annually, in consequence of the dependants deserting their posts, most probably to seek a more hospitable and flourishing place in which to earn a livelihood. Not one of these dependants can give a word in elucidation of their origin or that of the temple; they say they are descended from their fathers, and that their fathers' fathers were slaves and descendants of the original dependants of the temple. None of them can tell who ordered them there, nor are there any documents relating to the subject.

A two hours' ride in a northerly direction from Nakon Wat brings the traveller to the ruins of the capital of ancient Cambodia: they are named Nakon Hluang. The wall, built to protect the city, encloses a space of 194 sen, equal to 4 miles 1366½ yards English: they are of great height and solidity, and are built of the conglomerate previously mentioned as used in the construction of the road to the grand temple. The city is entered through a gateway built of freestone, the height of which cannot be less than one hundred feet. This structure has been as yet little injured by age, and presents a picturesque monument to the view of the beholder. No traces exist of any woodwork about it,

although it must have had gates of that material. On each side of the road it contains rooms, probably built for the accommodation of the janitors. According to the natives, there are four of these gates, one on each cardinal point of the compass. The ravages of time, so merciful to the temple, have not extended equal consideration to the city; for, with the exception of a few edifices, little else can be seen of the buildings—some of which must have been of great extent—but a shapeless pile of enormous blocks of stone, which generally effectually destroy the form of the structures of which they were a part. The chief edifice is the palace of the first king: this, from having been built entirely of stone, has withstood the onslaught of age better than any of the other buildings, although it is also in a very ruinous condition. Approaching from the east—the direction towards which the principal entrance faces—access is gained to the royal residence by a line of passages and doorways formerly roofed in with the masses of stone which now block up the way, and through a wall two feet thick, built of the freestone that encircles the edifice. These approaches, judging from the fragments thickly scattered about, seem to have been well ornamented with statues and figures. After entering the precincts of the palace there is a labyrinth of corridors and passages of small breadth and height, roofed with stone, which run at right angles to one another, forming small open quadrangles, by means of which light seems to have been admitted to them. These corridors, although of such narrow dimensions, but seemingly interminable in length, must have formed the main portion of the structure. They pass at intervals into a number of small chambers leading from one to the other, which could have afforded but scanty accommodation to the royal occupants and their dependants. Surrounded by these corridors, stands the central structure, to which ingress is afforded, as it is raised many feet above the ground, by a flight of steps. This, containing the exclusive apartments of the monarch, possesses no space, being divided into chambers of similar size to those on the basement. It consists of a succession of towers, of an octangular shape and of little height, richly sculptured, and having on each face a representation of a head, either celestial or human, of colossal magnitude. Covered galleries connect these towers with one another. Although internally for the most part plain, the towers and corridors have their exterior plentifully and superbly decorated with elaborate chisellings, principally of females splendidly robed and adorned with jewels, the expressions of the faces and the contour of the limbs of whom are depicted with considerable beauty and artistic merit. The number of towers is great, but all attempts to form a correct plan of the building are frustrated by the ruinous state in which it is, and which renders access to many parts impossible. The vicinity of the palace exhibits the remains



of a large number of edifices of various characters—temples and palaces succeeding each other in every direction. In many places there are cleared spaces round the image of some colossal Buddha or other deity, works carried out by the natives at the bidding of some wealthy devotee at Bangkok, Oodoong, or some other large town, who thought by so doing to acquire no small share of merit for himself from the next world of his religion. Some of the images, which are encountered very frequently in wandering through the jungle on the site of the city, must have cost fabulous sums in their construction, many being composed of brass or bronze coated with gold to the thickness of one-thirtieth of an inch. Perhaps the most interesting relic of antiquity to be seen at Nakhon Hluang is the statue now standing, neglected and solitary, in the jungle of Phra Pathim Suriwong, once the monarch of the city, and the vast regions that were subject to it. He was afflicted with leprosy, and his statue represents him holding a cup of medicine prescribed as a cure for the disease, which he is about to drink. This figure, which was life-size, has been damaged, having had a part of one arm and the cup broken off. Nearly every ruin at Nakhon Hluang is rich in inscriptions engraved in two different characters, the one being very generally used, whilst the employment of the other is exceedingly rare. The character of that ordinarily used by the Cambodians is the Bali; but no person in Siam or Cambodia has yet succeeded in deciphering the inscriptions, notwithstanding they can read them fluently. The natives say that there must be some key to their meaning which has not yet been detected. One stone covered with inscriptions is pointed out by the natives as having a communication between itself and the sea on the other side of the earth: they assert that when the waves are high the stone moves to and fro; however, their knowledge of geography is not sufficient to enable them to state what ocean has the honour of so near a connexion with the stone. Extending to a distance of three days' journey from Nakhon Hluang, there are, according to the authorities of Angkor, the ruins of three cities besides another large sanctuary, and on all sides exist vestiges of edifices showing that the country, now a complete wilderness, must have been at the time of the construction and completion of these edifices most thickly populated and exceedingly flourishing. Few countries present a more striking picture of a lapse from the highest pinnacle of greatness to the last degree of insignificance and barbarism than Cambodia; nor is there a nation at the present day which can show so few records or traditions of the past, or produce so few clues to her ancient history. Beyond the fabulous narratives of the Chinese historians and a few legends which, it is to be feared, are more the composition of a barbaric priesthood to strengthen their dominion over the minds of

a superstitious people than any narrative handed down from generation to generation, the world has no accounts relative to this once powerful but now degraded country.

The present King of Cambodia, who resides at Oodoong, states that he has found sufficient evidence to warrant him in ascribing the erection of Nakon Wat and Nakon Hluang to a period antecedent to the Christian era; and a few years ago, on abolishing the bullet-shaped coinage for a flat kind, he took the opportunity of perpetuating the remembrance of Nakon Wat and the former greatness of his country by depicting a view of the building on his money. The present Major King of Siam, who was for many years the chief of a Wat, and who has taken a great interest in the subject, both from the religious associations of his former profession and because the founder of his dynasty emanated from Cambodia, states that all history of India beyond the Ganges antecedent to 400 years ago or so is altogether unworthy of credit, being full of fable often laughable. In one of the volumes of the Buddhistic scriptures, Cambodia is enumerated as the sixteenth of the sixteen principal nations then dominant on the earth, and is referred to as a country where liberal views were allowed full scope—so much so that it was said of it, as of Yona, there is there no Brahmin aristocracy or hereditary nobility, for in Cambodia a nai (master) may descend to the dependency of a bǎo (servant), and the servant become possessed of the dignity of a master. In the 3rd century, A.D. 200, the Cambodian monarch lived who founded Nakon Wat. He was named Bua Sivilithiwong, and gets credit for being the king who first invited Buddhist priests from Ceylon to his country—an importation of whom has frequently taken place since those days. These voluntarily ostracised priests brought their religious works with them, and, in order to preserve these sacred documents, the king had a building constructed of stone erected for their reception, and in it these ancient works are said still to be safely treasured. The books were made of the material used in those days, mere palm-leaves; “And do you think they would endure?” was the rather incredulous query of his Majesty, when narrating the reputed circumstance.

Bua Sivilithiwong was, we might say, fortunately a leper, as it was to propitiate the goddess of health in order that his loathsome malady might be healed, that the magnificent building of Nakon Wat was erected. After its completion the king, finding the leprosy unabated, abandoned his reliance on a cure from works, and resolved to seek advice from terrestrial mortals. Accordingly a proclamation went forth offering a great reward to any one that would effect a cure: what such was at that period is left to individual conjecture, but if not more than bestowed nowadays in Cambodia and Siam, we need not be astonished at the all but

total failure of applicants for the royal bounty. Only one person, a celebrated Brahmin *rusi* or *fakir*, volunteered to undertake the cure of his Majesty. The *fakir* was a firm believer in the virtues of hydropathy, but preferred the liquid in a state of ebullition, and actually proposed to boil his royal patient in a vessel of aquafortis—literally corrosive liquid. The King naturally demurred to such an extreme procedure, and expressed his desire to witness the safety of the process in the person of some volunteer: none such could be found, and the *fakir* therefore suggested that the experiment be tried upon some criminal. The King, however, who, in truth, had become jealous of the Brahmin's supernatural powers and feared him, thought it a politic opportunity of getting rid of the *fakir*, and therefore invited him to get into the kettle himself. "I am willing to do so," replied the Brahmin, "if your Majesty will solemnly promise to throw in after me a certain powder I will leave with you." The required promise was instantly made, and the luckless *fakir*, who put faith in princes, leaped into the boiling cauldron. The leper King then ordered the vessel to be taken up and its contents poured into the river. For this breach of faith a curse clung to the King and his city: is it not a city of ruins to this day?

His Majesty the Major King of Siam says that tradition makes *Talæ Sap*, the great lake of Cambodia, once a fertile plain where stood a great city. A King, for his amusement, kept some pet flies, whilst the instructor of his young princes, his children, amused himself by feeding some pet spiders. Now it so happened one day that these pet spiders ate up the King's flies, whereupon the King was greatly enraged, and was about putting the preceptor to death, when, lo! he ascended through the air cursing the King and his royal city. Immediately the entire plain sank, and was immersed beneath the lake we now see. Tradition also says that the jasper image of Buddha, which is the glory of the temple in the royal palace at Bangkok, was then found floating on the surface of this lake in a lotus-flower in charge of a *Yák*. It at last was taken up to *Chieng Rai*, a Laos city at the north, where a pagoda was built for it, and from that city the Siamese derived it. There are other accounts, however, of the origin of this famous image.

#### NATURAL HISTORY.

The natural history of Cambodia and South-Eastern Siam, from its having been as yet almost entirely unexplored, presents a most novel and interesting field to the naturalist. The zoology naturally partakes of the general characters of that of the ultra-Gangetic nations of the same latitude. Of *pachydermata*, the elephant, called *chang* by the Siamese, but *tum-ræ* by the Cambodians,

stands of course pre-eminent. Inhabiting vast plains of the most fertile pasturage which form the principal geographical features of Cambodia, this giant mammal is to be found in its prime. Countless herds of them haunt the banks of the lake in the dry season, whence, when the plains are flooded by the rains of the wet season, they pass to higher grounds, and it is then that the most daring of the Cambodian hunters venture to slay them. This they do in a truly singular manner: armed with an old flint musket charged with powder, and a barbed arrow empoisoned with the product of some forest-tree, they proceed in boats over the flooded jungle to where the elephants, seemingly reluctant to leave their accustomed pastures, are browsing on the leaves of such trees as the high floods have as yet not covered. Having marked out one whose tusks show promise of a handsome reward for their toil, they fire at his belly, as what they consider the most vulnerable part; the enormous beast sometimes yields in a few minutes to the deadliness of the poison, but at other times will go for many hours ere he drops, during which time the hunters most carefully watch him. When the venom has at last done its work, they cut off his tusks and tail, then skin and take the fat, bones, and the greater part of his flesh, all of which find a ready sale among the Chinese of the towns. It is to be regretted that we are not yet acquainted with the tree from which this poison is extracted, but I strongly suspect it is procured from a species of strychnia. Certainly it is a very remarkable circumstance that, when eaten, the flesh of animals poisoned as above described should be destitute of deleterious properties; but in the case of the virulent poison, termed "Urari," used by the Indians of Guiana, we have an exactly similar case. In the 'Pharmaceutical Journal' for April, 1857, I find it stated as follows:—"It is well known that with such poisons, more or less weakened, the Indians mostly kill their game. This refers to the thick skinned tapir, to the fleet deer, the agile monkey, as well as to the largest or the smallest bird. Even the wild cattle which roam over the savannahs of Pirará and Fort San Joaquim are secured in that way—without that, the meat of the animals thus killed proves injurious to those who partake of it. On the contrary, the employment of urari in killing the animal renders the meat more tender; and, following the example of Father Zea, the missionary who accompanied Humboldt up the Orinoco, we killed, during the Guiana expedition, the fowls which we purchased from the Indians, and which usually were uncommonly tough, by means of a poisoned arrow, rendering thereby the flesh more tender." As a domestic animal the elephant is everywhere extensively used; every man of but small consideration having one or two for his personal use. They are, however, not to be compared with the elephant of Hindostan in point of training. Elephants fit to be

used as an instrument of attack in war, so much spoken of in all descriptions of Oriental regions, are extremely rare; and it is affirmed that in the late wars between Siam and Cochin China there was but one in the Siamese army who could be urged to assail the enemy, and he is reported to have killed more Cochin Chinese in one battle than the entire Siamese army. In their wild state many of the males, like those of Ceylon, have no tusks.

The rhinoceros exists in considerable numbers in the immediate vicinity of the lake and at the bases of the mountains. This animal, like the preceding, is hunted for its horn and skin, and the Cambodians are very adroit in its pursuit. A number of men armed with long, sharp-pointed bamboos, proceed into the woods frequented by the animals. Having discovered the retreat of one, they surround him noiselessly; then, approaching within a short distance of him, they shout to attract his attention. On seeing his pursuers, the infuriated beast rushes open-mouthed to attack them; they then seize a favourable opportunity, and with a surprising dexterity plunge the bamboo down his throat. The animal soon falls suffocated by the consequent hemorrhage. This manner of killing them is not, however, always followed, as they are often shot with ball.

A superior breed of hardy, well-formed ponies is universal. The pasturage afforded by the plains is very well adapted for them. It is from this country, the Siamese acquired parts of Cambodia and Laos, that the nobles at Bangkok procure their best beasts. Among the ruminantia, Cambodia has six species of deer, three of wild cattle, and the buffalo. Perhaps the most interesting novelty in East Indian zoology to be found in Cambodia is the three species of bovidæ. They are named by the people *ngua kating*, *ngua deng*, and *ngua dam*. The first species is a rare animal of colossal size, with enormous horns. Its colour is black, and its motion is described as a continuous jump. From its great strength it is much feared by the two other species, and even, it is said, by the rhinoceros, which cannot withstand its force and agility. The second named species, "*ngua deng*," or red ox, is also of great size. The bulls have large horns, stretching forward; the cows are similar to the common domestic animal of the same species, but have not the hump. Both male and female are of a uniform brownish-red colour, with the belly and throat white. The third species, "*ngua dam*," or black ox, is like the preceding in size; their colour is a black or blackish grey. The cows, unlike the red cattle, have short horns curved forward, and have not the pendent pouch of skin which the cows of the preceding species have under the throat. They frequently occur on the plains in herds of from 50 to 300 at a time, and afford good employment to the huntsman. In the domestic state two species of

oxen are to be met with ; they are universally employed as beasts of burden. The one is the common humped species, and the other a small race of a red colour, without humps : both kinds have very short horns. The first occurs black, white, and red. The buffalo, although extremely common in the domestic state, is more generally wild, the abundant pastures affording such great facilities for their increase. Those wild are of a much greater size than those domesticated, and have horns of enormous size. They are also endowed with an extraordinary amount of strength, and it is said can knock over a good-sized elephant. The horns and hides of this, as well as the oxen, form articles of commerce.

Among the reptiles, one, the crocodile, is very common, and forms an article of trade with the Cochin Chinese. Boats go annually from that country for the purpose of catching them : this they do by adroitly inserting a piece of wood sharpened at both ends into their mouths ; they then fasten a strong line to them and bring them on shore. As they endure want of food well, they arrive in good condition at the end of the journey to Cochin China, where they are highly prized as food.

XVIII.—*Diary of a Journey with Sir Eyre Coote from Bussora to Aleppo in 1780 (?)*, from the original MS.

Communicated by Sir WOODBINE PARISH, K.C.H., F.R.G.S., &c.

*January 30th.\**—SET out from Xebire with the caravan, in company with General Coote and Mr. Thompson. Our force consisted of forty Arab camel-men armed with long spears and matchlocks, and forty armed with matchlocks only, exclusive of camel drivers with swords and lances, and five European servants with fusils. Xebire is a considerable town, containing about five thousand inhabitants, all Arabs, but under the jurisdiction of the Governor of Bussora, from which place it is about 12 miles distant to the westward. This has formerly been a very large

\* Although this Diary is of old date, it is interesting from the notices it contains of the remains of ancient cities which the writer visited near Taibeh, and in the vicinity of the Great Salt Lake, to the south of Aleppo, where he counted, as he says, above *twenty great mounds*, covering in all probability the ruins of ancient temples and buildings which to this day are still unexplored, although the existence of some of them has been known since the time of Pietro della Valle, who passed over much the same ground as the writer, and mentions having seen the ruins which he describes near *Taibeh*.

Dr. Helfer, also of Col. Chesney's expedition, gave some account of an ancient city which he visited in 1836, about four hours south-east of the Salt Lake to the south of Aleppo, the ruins of which seem to be the same as those mentioned by the writer ; but with this exception I am not aware that these remarkable and extensive remains have ever yet been explored or particularly described by any modern traveller.—W. P.

place; there are still to be seen ruins for many miles round it, particularly towards Bussora, where a gateway and many shafts and pedestals of columns are still standing. The pillars are of stone, and round; but the bases of them are hid in the rubbish, and none of the capitals are to be seen. The walls may be traced, as I was informed, above 10 miles in circumference; and there appears to have been a canal cut from the sea to this place, leading, as the inhabitants say, up to Korner, where the Euphrates joins the Tigris. The ancient name of this place is said to be Jama Ali, or the Church of Ali, to whom it was probably dedicated when all the trade of the Indies was carried on to Enrope by land. This place being the last from the ancient Balsora towards the Desert, it was probably the stage from which the caravans set out on their journey westward, and consequently a place of considerable trade. Having mentioned Balsora, so famous of old, it will be necessary to observe that it is not the same with the present city of Bussora, but the ruins of it are to be seen for an extent of 10 miles, on an island about 20 miles below Bussora, at the junction of two great rivers, the Shat-el-Arab, and the Karoon, which descends from the mountains of Persia. The island on which it stands is called Haffar. Nothing is now to be seen of it but heaps of ruins, and the whole country round covered with broken bricks. This day, and the next as our people were not all collected, we encamped about 5 miles from Xebire, at a small village on the Desert; the soil is gravel, mixed with flint and white stones, rounded and polished, from which one might conclude that they had been rounded by the action of water, and that in times of old the Desert had been covered by the sea. Round this village, at about a quarter of a mile distance, the inhabitants had dug wells, protected by small clay turrets about 20 feet high, capable of holding ten or twelve men; these wells were not above 15 feet deep; some of them had a wheel and leathern bucket for drawing water for their little farms, consisting of about 30 acres of poor land generally, and sown with barley, that seemed to spring up thinly, though they appeared to take much pains with its cultivation: there were also some beds of onions. My reason for noting these particulars is, to show that, as appears to me, water may perhaps be found at a small depth in other parts of the Desert, and that though the soil is in general the same as above mentioned, extremely poor, it is not absolutely incapable of culture, and that any part of it, when watered, will produce barley or oats; but the sand being so predominant, and there being scarcely any rain in this climate, chiefly from the want of mountains to condense the vapours, the very grass, and even the seeds of it, are burnt up in summer, so that there is scarcely an herb to be seen when the rain returns to renew vegetation.

*February 1st.*—We left our encampment about 8 o'clock in the morning, course north-west; the road over gentle risings and fallings, hardly perceptible; the soil generally gravel, but sometimes small sand, tufted with a kind of grass like bent, upon which the camels feed. Travelled till 3 in the afternoon.

*Feb. 2nd.*—Set out at  $\frac{1}{2}$  past 7; the road much the same as the preceding day. Saw some hares and several Desert rats.\* This animal resembles a rat in nothing but the tail and feet; the tail is, however, somewhat longer, and ends in a tuft; the head is like a rabbit's, and the mouth has four prominent small sharp teeth, like a hare's; the colour is sandy white, and the size is that of a common rat; but that which particularly distinguishes this animal is the great length of its hind legs, which are more than three times as long as its fore ones; the hair is exceedingly soft and fine. Travelled till about 25 miles. Rain fell.

*Feb. 3rd.*—Set out at  $\frac{1}{2}$  past 6; saw some rising ground, and in a bottom found a pool of water our guides told us of; collected all the caravan before we approached it, lest any of the wild Arabs should be encamped round it. This was the first water we had seen since we left Xebire. We halted  $\frac{1}{2}$  an hour to water the camels, but very few of them would drink. We filled some skins for our own use, and found it very good. About  $\frac{1}{2}$  an hour afterwards we discovered, on leaving this place, ten Arabs; the sheik of the caravan rode out to reconnoitre, and found them to belong to Xebire. They were gathering truffles, which grow in great plenty in the Desert. This day travelled about 24 miles.

*Feb. 4th.*—Proceeded on our journey at  $\frac{1}{2}$  past 6; the road through a kind of heath or brushwood; the soil, a deep soft sand as usual; in the distance we saw hills gradually rising about 40 feet above the level of the plain. In many places we discovered the base-rock, which was of a hard free-stone. About 12 passed two pools of water, but the camels did not drink. Saw many traces of recent Arab encampments. At  $\frac{1}{2}$  past 4 encamped between two hills; went to the top of one of them in order to look for some high mountains to the northwards towards Bagdad, which the sheik told me might sometimes be seen from that place, but though the air was very clear we could not discover them. The weather very warm from 11 till 3. Travelled about 27 miles.

*Feb. 5th.*—Started about  $\frac{1}{4}$  before 7; in  $\frac{1}{2}$  an hour we descended into the channel of a river, which was  $\frac{1}{2}$  a mile broad, but quite dry, excepting some standing pools. The ground on each side was ragged, and consisted of hillocks of chalk and lime-

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\* These creatures are called by the Arabs *Jerba'a* (plural *Jerba'ia*), and are known to European zoologists by the same name, *Jerboa*. They are larger than a rat, and resemble greatly the kangaroo in their construction and in their manner of hopping. They are esteemed a great dainty by the Arabs.—C. G.



stone. In  $\frac{1}{2}$  an hour more we crossed another watercourse, which was probably a branch of the same river; afterwards we got upon the plain, which was beautifully interspersed with green spots of grass, pretty thick and long. About 12 we came to the channel of another river, and dined upon the bank, which was green and pleasant. The people filled the skins in which they carried their water. Travelled over a fine grassy plain till  $\frac{1}{2}$  past 3, when we encamped.

*Feb. 6th.*—The sheik of the caravan informed us that his scouts had during the night discovered the fires of the Muntifick Arabs, a nation so called from its being a confederacy of several tribes, as the name imports. He said they were about two points to the southward of our course, and hoped, by keeping a little to the northward, to avoid them; we marched about sunrise, and saw several antelopes. In about  $\frac{1}{2}$  an hour came into a fine green valley, in which we kept for some time; but as it led too far north we quitted it, ascending the hills, which were nothing but heaps of stones, till we came upon the plain of the Desert. About 8 we discovered several flocks of cattle in an extensive valley, and a number of men, camels, and horses, which we now approached. We knew them to be the Muntificks, and being discovered by them, it was in vain to endeavour to evade them: we therefore continued our march till we came into the valley, where we collected our small force together, keeping our baggage upon the right, where there appeared to be the fewest Arabs. The plain, as far as we could see, was covered with horses, oxen, camels, sheep, and goats, in different herds, under their various keepers; and to the left we observed encampments. The sheik of our caravan having interrogated some of the Arab horsemen who came up to us, he was told that Sheik Abdallah, the chief of the nation, was set out on a pilgrimage to Mecca, and his eldest son to Bagdad, to settle some affairs with the Bashaw, to whom they do homage for their pastures on the river, where they are obliged to go in summer, there being no water in the Desert. The tribe was therefore represented by the second son, who was but a boy, as we were told, and was then in another valley some miles in our front. Our sheik sent off a messenger to inform him of his arrival, and in the mean time, having prepared as well as we could against any attack, we proceeded on our march through the valley, and ascended the hills on the other side, without the least interruption, whence we could see the whole Desert before us, overspread with droves of cattle; and as they were in motion to the eastward, we passed through the midst of them, and, excepting two or three messengers that came from the chief, the rest of the people passed on, hardly noticing us. I have frequently, since I came among the Arabs, observed that they affect not to wonder at anything,

nor stare at novelties as people in Europe do, deeming it, no doubt, mean and childish to give way to impertinent curiosity. Several of their women of the better sort were mounted on white camels, on raised seats, shaded by a fringed umbrella; the trappings of their camels were chiefly of scarlet cloth, quilted and fringed with yellow, and adorned with long tassels of various colours that hung almost to the ground; they managed the camels themselves by a kind of halter and a hooked staff; they were all dressed in blue veils, but some of them uncovered their faces, which were dark, though in general handsome. The number of animals in sight (for we could not see the whole of them) certainly exceeded 400,000 head on the most moderate computation, but the horses were not numerous, nor did we see many cows, so that these flocks consisted chiefly of camels, sheep, and goats. We inclined to the northward, to keep as clear of them as possible, and about 10 o'clock we had passed them all; but as we had not made our presents to the chief, we were obliged to encamp, which we did in a small valley, surrounded on every side by high grounds, which was anything but a safe place in case of an attack, though we might have taken possession of some of the neighbouring hills, which were capable of being defended. After we encamped, the sheik of our caravan set out for the chief with some presents, consisting of dresses and fruit of various kinds, but did not return that night.

*Feb. 7th.*—In the morning, about 8 o'clock, we shifted our camp to the plain, about 2 miles on our course, and in the afternoon about 2 o'clock the sheik of our caravan arrived, but it was too late to march that night.

*Feb. 8th.*—Set out in the morning at day-light; the road very good, over fine green plains, and low hills of limestone and gravel. About 3 in the afternoon saw some Arabs, and having spoken with them, found they belonged to the tribe called Beni-Khalid, or the children of Khalid, and that a considerable body of them were about an hour's journey a-head of us. We therefore encamped, that we might keep as clear of them as possible. Our sheik went forward with some of the Ben-Khalids, and carried a present of a dress, 25 ducats, some sweetmeats, and fruit, for one of the chief's sons who commanded that part of the tribe; in the mean time some shepherds and their wives came into our camp with sheep, goats, camels, and butter for sale, and our people bought two fine milk goats for 8 piastres, and some lambs for eating; the price of the best camels was 20 zernaboobs, about 10s. of our money. The sheep were remarkably large and fine, having very long ears and heavy tails, like those of Africa. In the morning our sheik returned, having obtained leave to pass.

*Feb. 9th.*—We marched at sunrise, and in about an hour discovered all the country before us covered with flocks grazing in

separate herds. Our sheik endeavoured to keep clear of the thickest of them by going to the southward of our course; he informed us that 15,000 horsemen had gone the preceding evening against some tribes who had invaded their territories on the side of Bagdad, and that a body of their fighting men were in pursuit of the Muntificks whom we had seen retreating. We were passing for three hours through their cattle and tents, but saw nobody in them but old men, women, and children. When we occasionally stopped before any of their tents to look at them, the women ran out to us with bowls of buttermilk, &c., some of which we drank. They were not very elegantly dressed, having only a gown and blue veil of coarse cotton; their faces were half covered with black crape; they were extremely timid to all appearance; the tents were mostly made of a black kind of cloth, fabricated of coarse camel's wool, and they were pitched something in the form of booths in a fair, open on one side. The Ben-Khalids are independent, and seemed the strongest tribe in the Desert, being able to bring a hundred thousand men into the field. It struck me that possibly this tribe might be the descendants of the ancient Chaldeans, from their name, as Khalid in the plural is Chaldean,\* and it is but the English plural added to it, which makes Chalideans. The road very good through a plain, covered with long grass. We encamped at 3 o'clock.

*Feb. 10th.*—Set out at 7 o'clock; passed some of the Ben-Khalids; the road very stony all day, and the country extremely barren. We halted at 1 o'clock, being obliged to fill water at some deep wells, at a distance from where we encamped.

*Feb. 11th.*—Set out in the morning at 7 o'clock; the road through low hills and loose rolling stones: we killed a number of hares. This day we passed beyond the boundaries of the Ben-Khalids and entered those of the Arabs of Airac, who inhabit the western banks of the Euphrates, opposite to Bagdad. Halted at 4 o'clock.

*Feb. 12th.*—Proceeded on our journey at  $\frac{1}{2}$  past 6; the road over low hills and valleys, not so stony as the preceding day; in the evening saw something like a cloud, which, from its movement, we took to be locusts, but on approaching nearer we found it to be a flight of birds, like quails, that made a noise on the wing like rooks, but not quite so hoarse. In an hour afterwards we came to a ruin, where we encamped; it was a square building of stone, about 30 feet high; on three sides casemented with very good arches, having four good chambers on each side, with Gothic doors inwards; many of the arches were fallen in; near it was a

\* Khalid, plural in Hebrew Khaledim; but in Arabic the plural would be Khalād or Khaled. It is possible that in this tribe we have the name of the ancient Khaledim preserved.—C. G.

deep well—so deep that we could scarcely see the water. About 10 feet of it, towards the top, was built up with stone and lime, to prevent the loose earth from falling in ; all the rest was dug out of the rock, which was full of holes in the sides, where we saw a great deal of birds' dung, and concluded that the birds we saw either had their nests there, or used to descend for water, and ascend by means of these holes, which they could not do if the sides were smooth. Near the well was a large square reservoir, and two oblong ones that seemed to have been arched over, from a small part of the curve of one that remained. They had stairs to descend to them, and it was evident, as they contained no water at that season of the year, that they could not at any other—therefore they must have been artificially filled from the well, when large caravans passed that way ; and the building before described may have been a sort of fort for the protection of the people, who were probably stationed there to fill them with water when the great annual caravan passed from Bagdad to Mecca, for, upon inquiry, I found this was the direct road to that place, and that the Caliphs had made wells and forts of a similar kind at the end of every stage.

*Feb. 13th.*—We moved on at 7 o'clock ; in  $\frac{1}{2}$  an hour our scouts brought intelligence of a large party of Arabs, mostly horse. We continued our march, ready to receive them, in case they should prove enemies ; on coming up with them we found they consisted of about 100 men, the guard of Abdallah, the chief of the Muntifick tribe, who had, previous to his journey to Mecca, been to visit Mesjid Ali, a famous place of worship, upon the banks of the Euphrates, near Bagdad. He was now on his direct road to Mecca. Our sheik presented him with some fruit and other trifles, and we parted. About 10 o'clock we came to a fine reservoir of water on the Bagdad road, where we took in water for three days. Our people got a great quantity of truffles. Encamped at 4. Several Arabs mounted upon asses, clothed in deer skins, came into camp : they were called Ghizzias, and we were told were outcasts from all the tribes ; and were very numerous in the Desert ; subsisting upon deer, hares, and truffles, and robbing such companies of travellers as they could master. We did not like to see them in our camp, and desired the sheik to turn them out ; whether he was more afraid of permitting them to go away to carry intelligence than of watching them well all night, I know not, but he gave them food and kept them in camp. Saw a large black snake this day.

*Feb. 14th.*—Set out at 7 ; saw some more straggling Ghizzias in the morning and afternoon ; the road very good, and the country full of hares, some of which we killed. The ground this day and the last was full of small white shells of the snail kind.

*Feb. 15th.*—Marched at sunrise ; the Desert very level, and the soil hard sand and gravel. Encamped at 4, and sent our four scouts to reconnoitre the roads.

*Feb. 16th.*—Marched at 7 o'clock ; at 9 came to the channel of a river which was dry ; we continued to follow it downwards till 1 o'clock, when we came to the point of a high cliff, under which there was a fine sandy deep pool of water. We encamped near it to fill our skins, and to wait the return of our scouts. The hills about the banks were pretty high and white ; the banks were a kind of free-stone, mixed with strata of flint and limestone ; all the strata horizontal, and appeared never to have been moved since their original formation. The name of this river is Abhiccate, or the Water of Life.

*Feb. 17th.*—Proceeded at 7 o'clock ; the Desert very level till towards evening, when we encamped near some hills of limestone, and found water at a small distance.

*Feb. 18th.*—Set out at  $\frac{1}{2}$  past 6, and passed a remarkable little hill upon our left that rose like a steep rock out of the plain ; at 12 passed through a ridge of white hills like chalk. Encamped at 4 upon the bank of a dry river or watercourse, where by digging in the sand we found good water.

*Feb. 19th.*—Moved at the same time as yesterday ; at 10 passed an old fort, called Thamiel, near which was a small pool overgrown with reeds, and two young date trees. At 12 passed through a number of white sand hills, one of which was remarkable by having a hole through it, and being bigger at top than in the middle. Our scouts brought intelligence of some Arabs on the right ; turned off to the left, and encamped at 4 ; after which we were startled by four Arabs, who were gathering truffles.

*Feb. 20th.*—Set forward at  $\frac{1}{2}$  past 6 ; passed several white hills ; at 2 in the afternoon saw a number of camels feeding, from which we concluded that there was a tribe of Arabs near, on which account our sheik halted in a little valley, and though we were very desirous to get on, he refused to stir until he got intelligence about them ; four men were sent off as soon as it was dark, and as the sheik told us he would march in the night, no tents were pitched. We waited for the return of the scouts till  $\frac{1}{2}$  past 12, when they arrived, and informed us that the tribe called Barge were close by, they having spoken with some of them : we therefore got as soon as possible in motion. The night happened to be overcast, and was exceedingly dark, insomuch that we could not see one another ; when day appeared we found that we had lost one of the camels, on which two servants rode. People were sent out on all sides to look for them, and after losing two hours we proceeded with all expedition the rest of the day. We passed several flat hills, and crossed some dry watercourses. In the evening passed through a ridge

of hills into beautiful green valleys. This place was called *Húlet Haurán*,\* or the sources of Haurán. These hills divide the territory of Bagdad and Syria; from them we saw the Desert a great way before us. We encamped at sunset in the channel of the river Haurán, which was dry; the sky was now more cloudy, and the weather much colder.

*Feb. 21st.*—Proceeded in the morning at the usual time, following the river towards its source till 12 o'clock; we expected to find some water, and dug in the sand for it, but it drained in so slowly that we went on without filling above two or three skins. In the evening we passed over a fine plain country, the soil being very good, though for want of moisture, like the rest of the Desert, only covered with thin grass and poor shrubs. Encamped at 4, and sent out in search of water, but found none.

*Feb. 22nd.*—Set out in the morning at  $\frac{1}{2}$  past 6; the weather very sharp and cold; passed several hills flat at top, and sloping like terrace-walks at the sides; in the afternoon saw a stray camel and the recent tracks of about a hundred horses, which alarmed our people, and they consulted how to proceed. We continued our course, however, and passed a fresh encampment, where we picked up a dog; we kept a good look out all night from the hills that surrounded us; we had no water this night, and many of the people had had none the preceding day.

*Feb. 23rd.*—Set out at sunrise, and directed our course more to the northward; at 10 came in sight of some hills on the right, under which we were told the Euphrates ran; at noon a lion† crossed the caravan, walking towards the river, through some bushes and rocks, but we did not follow him; in the evening came to the course of a river called Gibbut,‡ like all the others we had seen in the Desert, dry: we found, however, a well by the side of it; it was as narrow as a chimney, built with free-stone, and about 15 fathoms deep. We sounded with a rope, but it came up dry; nevertheless the Arabs did not despair of finding water in it; they sent a man down, who found a kind of horizontal gallery on one side of it, which afterwards descended to the water. This was undoubtedly an artifice of the Arabs to prevent strangers not aware of it from drawing off the water. This water was clear and good, but they got it so slowly that there was only enough for our present use. Saw a number of wild hogs.

\* This is very important. The name *Húlet Haurán* would lead one to infer that the Wádi Sir Eyre crossed had its source in the Haurán. May it not be a continuation of the Wádi-en-Nemāreh, which I discovered in 1857, and which ran n.w. from where I left it? I see a Wádi Haurán marked in Chesney's map: this must be the same that Sir Eyre crossed.—C. G.

† Lions are extremely rare, I believe, in this Desert. The Arabs told me there were a few, but chiefly about Babylon.—C. G.

‡ *Gibbut*. I do not know the name, but from its appearance it is wrongly spelt.—C. G.

*Feb. 24th.*—Marched at sunrise; the Desert level, and the road good. Encamped about 5 o'clock. An ostrich passed the caravan.

*Feb. 25th.*—In the morning passed five wells in a green valley; they were dug in the rock, and the water was very clear and good, though the Arabs did not think so, because they were not used to spring water. At noon saw the mountains of Tyba and Tadmor, or Palmyra; we directed our course for the former, and encamped at sunset. The Desert level, and the road marked by heaps of stones.\*

*Feb. 26th.*—Marched before sunrise; at noon entered a plain between the hills; passed a lion's den; some showers of rain. At 4 met with two Pahlomars with letters for Bussora; they had been robbed of their camels on the way to Aleppo. Encamped at 5 to read the *European Gazettes*.

*Feb. 27th.*—Set out at sunrise; in half an hour saw two round buildings upon the plain;† they seemed small at a distance, but as we approached nearer to that on the right we were surprised at its magnificence; upon examination we found it consisted of two square buildings, one of 200 paces, the other of 100; the walls were of fine hewn stones of a reddish colour, and about 12 feet thick and 40 feet high, all round, excepting some portion which had fallen down. The largest building had 24 towers, the smallest 12; the entrances were not very large, but elegantly finished in the Grecian style within. We saw a number of arches supported by pillars of white marble finely polished; as the rubbish had covered up one half, we could only see the upper part; the capitals had double flowers, exceedingly well finished; several broken pillars of marble were scattered about the area, in one part of which, where the Arabs appeared to have been digging, we found large vaults double arched, and it is probable the whole of the area was vaulted in the same manner. I was sorry I had not time to take a plan of this building. There was the ruin of an aqueduct that came from the mountains on the right to this palace, and from thence across the plain into the other building. We rejoined the caravan, and travelling about two hours, arrived at

\* "The road marked by heaps of stones." It is not clear whether by this is meant the remains of an ancient road, or heaps of stones placed at intervals to mark the track. The Arabs often do this.—C. G.

† Pietro della Valle mentioning this place says:—"On the 21st we passed by a ruinous castle called Hheir, which I had formerly seen only by night, when I went from Aleppo to Bagdad. I took a better view of it now, and found it to be a great building all of good and large white marble stones; the form of it is a long square with walls round about it, here and there distinguished with small round turrets; within are many contrivances of rooms, all likewise of white stone, but so ruinous that it cannot be known what they were.

"From hence we travelled about three hours farther, and at night arrived at Taibeh." —W. P.

Taiba, and encamped near a fountain of water, being the first we had met with on our journey. The water was rather hot, having a slight mineral taste; it boiled up from under a hill, near the eastern gate. The town of *Tyba*, or Taiba, does not appear ever to have been large; the walls of stone are about half a mile in circumference; they have two gates. On the eastern are many inscriptions, some of which I copied, in an unknown character. They do not seem, however, to have been coeval with the building, as they were not in proper compartments, but on the side of the gate, cut in different stones, brought perhaps from some ancient ruins. The buildings here are en décadence, and do not seem to have been ever worth notice. There is a minaret or steeple of Mahomedan architecture, and upon the outside of the western window, near the top, I discovered an Arabic inscription in relief, upon the upper part, on the outside, but could not get near enough to copy it. On the high hill that stands to the southward of this town we saw a building, and being curious to discover what it was, we climbed the mountain, and found it to be the tomb of a Mahomedan saint; the door was locked, but we opened it and went in, and found the saint embalmed, stretched upon a bier, with a canopy over it. Round the wall, in niches, there were lamps which the Arabs supplied with oil and kept lighted. The roof of the cupola was adorned with ostrich eggs, and the wall plastered round with writings chiefly from the Koran; there were also some papers covered with strange paintings and mathematical figures which seemed to be of an astrological nature. The Arabs informed me they were given to those who had performed a pilgrimage to Mecca, and contained future predictions. We left these holy relics and descended the hill; it rained hard, and here I could not but remark the great benefit which the earth derives from mountains by their condensing the vapours and occasioning rain, whereas in the flat Desert they are carried along by the winds without interruption, which is the reason that it seldom or ever rains there. We found a difference of climate as soon as we approached the mountains: the sky, which before was invariably serene, was now clouded, and we had small drizzling rain. Tyba was inhabited about thirty years ago, and a place of refreshment for the caravans; the grounds around still exhibited the signs of cultivation, for they were ditched and crossed in many parts by small aqueducts that conveyed water from the fountains. *Palmyra* or *Tadmor* stands about 60 miles to the south-west of this place; we were desirous of visiting it, but the whole country was over-run by a tribe of Arabs, called the Anazi, said to be the most powerful in the Desert, whose friendship it was necessary to secure by presents, and which would have required more time than we could spare. About 10 miles to the southward



of this there is an ancient city called Astachar, and by some Stictina,\* some part of which is still inhabited. On the way towards it there is a mountain of white marble, which may be seen as you approach Tyba from the Desert.

*Feb. 28th.*—Set out from Tyba, keeping pretty near the range of mountains on the left. At the foot of the hills, on the right, about 12 miles across the plain, we saw the ruins of a city, called El-Koom, where we were told there was a fine fountain, called Ain-el-Koom, or the fountain of Koom, which had occasioned the building of a town in this place. There is a magnificent aqueduct near this city, but we had not time to visit it, as it was out of our route; it is now uninhabited, but from the numerous tracks leading to it, we found it was much frequented by the wandering tribes on account of the water. The surrounding country is possessed by a tribe called the Mowallies. We found an ostrich egg upon the plain this morning. Our course was directed to the north-west. We halted in the evening for some hours, and setting out at 8 o'clock at night, about 12 saw a number of fires in our way: this obliged us to take another course towards the mountains on our left. In the morning we halted within 2 miles of them.

*March 1st.*—Set out again at 8, and in about two hours discovered a body of people travelling to the south-east. We sent out our scouts, who returned with information that it was the Bagdad caravan from Aleppo: it did not appear to exceed our own force. About 10 o'clock we saw a high mountain in front, and in the evening encamped within 4 miles of it; the ground this day was rather broken, and full of rat holes. We found the cast skins of several snakes.

*March 2nd.*—In the morning, having turned the point of the mountains to the left, we kept pretty close to them, and in a large valley to the left of a salt lake we discovered many ruins of great towns;† in one place there was a temple that seemed to have been overthrown by an earthquake, the pillars of which were Tuscan, lying all on the ground, near their bases, in one regular line; they were about 60 in number, and of a hard, irony kind of stone, not in the least damaged by the weather. The length of the building seemed to have been about 60 feet, and the breadth between the

\* *Astachar, Stictina.* Both these names are evidently not correctly given. It is striking how the country has become depopulated, and with the exception of Tadmor and Suhneh, there is not an inhabited place in the Desert, far or near.—C. G.

† The Salt Lake east of Aleppo is known, but many of these ruined cities are unknown; one of them, situated four hours south-east of the lake, was visited by Dr. Helfer, who was attached to the Euphrates Expedition, and whose account of it is given in Col. Chesney's book. The Arabs call the place "*Bel ul-U'm-Azra.*" The walls are said to be nine miles in circumference. He mentions also having been told of other ruins situated about six hours farther south; Col. Leake has suggested that they may be the remains of the ancient Androna and Seriane. (See Col. Chesney's Work, chap. xviii.)

pillars 30 on each side. There was an aisle, having two doors, exceedingly well ornamented and finished; the great doors seem to have been at the ends of the building; without, on all sides, there was a mound of rubbish about 16 feet high, so that the ruins could not be seen till you came just upon them. From this it would appear that some people must have cleared the ruins that are now visible, for the rubbish around seems to have been thrown out of the area. There were above twenty great mounds around, and I make no doubt but that each of them covered ruins, though none have been opened like the above-mentioned.\* The plain, for several miles, is covered with fragments of hewn stone and rubbish of buildings, so that this must have been a considerable city, probably from carrying on a trade in salt from the lake which now supplies a great part of Syria with that article; the whole ground being encrusted with it when the waters dry up, as the banks were at that time. We came in the afternoon to a place called Hagla, after turning the last point of the hills; here we found wells of water and the ruins of a town; near it there was a high mound of earth rising about 100 feet from the level of the plain, and from the top of it, in a line towards the west, we could discover about 15 more of the same kind. They appeared to me to be all artificial, for, having examined six of them, I found ruins all round them upon the plain, and some Latin and Greek inscriptions, though so defaced that scarce two letters remained legible. An Arab told me they were the burying places of my ancestors, but they did not appear to me to have been catacombs, but towers or forts to protect the towns near them from the incursions of the Desert Arabs. The soil here was exceedingly good, and this immense plain had been in former times full of inhabitants; the labour of throwing up these mounds, or rather hills, must have been immense. About 4 in the afternoon we came into cultivated lands, and at 6 arrived at the town of Suppine, built at the foot of one of the above-mentioned hills, which had a little fortification on the top of it. The town was walled with mud, and the houses, every one of which had a conic cupola, appeared like clumps of beehives. Here we encamped, and in the morning the revenue officers examined the baggage of the caravan, but permitted ours to pass on to Aleppo by an order from the Bashaw. The weather was exceedingly cold, and the ground covered with hoar frost.

*March 3rd.*—In the morning, about 8 o'clock, we set out, and in two hours discovered the city of Aleppo, which made a very magnificent appearance. The first object that presented itself was the castle, standing upon a hill, partly natural, partly artificial, in the middle of the city. This hill is almost as high as that upon which Edinburgh Castle stands, and the castle itself makes a finer appearance, though it is not half so strong. There are many very

fine minarets or steeples like the Monument in London, from the gallery of which the hours of prayer are proclaimed by the Mollahs with a loud voice. The buildings are large and flat-roofed, in the Eastern manner; the streets are narrow, but well paved; the bazaars or markets are arched overhead, and well supplied with all kinds of commodities; the inhabitants live chiefly in cains or squares, having no windows to the street on account of privacy for their women; the ladies are, however, permitted to go out in veils, generally white, and the streets and avenues to the town are full of them. The walls of this city have been pretty good, but they have been suffered to go to decay, like everything else in the Turkish empire; they are about 4 miles in circumference, but the suburbs are very large, so that the place is said to contain above 120,000 inhabitants, Turks, Greeks, and Europeans; by the latter of these its commerce is chiefly carried on. The environs of the town are all taken up by burying grounds, as they never bury twice in the same place, and put a head-stone to almost every person. The number of tombs is incredible, and remind one forcibly of the countless numbers of the dead compared with those of the living. The Europeans are but indifferently treated in this country; to threaten a Mahomedan is to run the risk of life, and when they go out they are liable to be insulted by the children and populace, who spit at them, throw stones at them, and call them names. What indignities will not men suffer for the advantages of trade with these barbarians! This is one of the inconveniences that attend trade, to make a people great at home, despised abroad, and subject to every kind of imposition and insult. The merchants of Aleppo, before our arrival, had been confined to their houses, on account of the outrages committed by the green heads or descendants of Mahomed, who alone are permitted to wear turbans of that colour. We hear they are again obliged to shut themselves up. The pro-consul, and all the gentlemen of the British nation there, came out to a village about 3 miles from the city to congratulate General Coote on his safe arrival; they were all well mounted on good horses, richly caparisoned; we joined the throng and proceeded to the city. About 12 we arrived at the Consul's house; there was a great mob of spectators, from whom, however, we received no other insult beyond the appellation of Caffer or Infidel, which we heard often repeated. The General was visited by the French, Venetian, and Dutch Consuls in turn, with all their several nations. The French are the first in rank here, and are most numerous, for they have superseded us in the trade with Turkey; they are prohibited from marrying, lest they should remain in the country, but the dragomen or interpreters have handsome Greek wives.

XIX.—*Journey in the Yóruba and Núpe Countries in 1858.* By  
DANIEL J. MAY, Esq., F.R.G.S., Second Master, R.N.

*Read, June 27, 1859.*

*To the Right Honourable the EARL of MALMESBURY, &c. &c. &c.*

Fernando Po, 13th November, 1858.

MY LORD,—I have the honour to report to your Lordship my proceedings in pursuance of Dr. Baikie's instructions to me, dated 23rd May, 1858, directing me to endeavour to explore some of the less known districts in the east of the great Yóruba country.

I left the encampment on the banks of the Niger early on the morning of the 24th May, accompanied by W. Reader, a man of the Bonú district, and a carrier, a man of the adjacent district of Bedé, both in East Yóruba, and through which it was probable I should pass.

I pursued my former route, leaving the river at Fángan, and arrived duly at Ilórin at 11 A.M. of the 27th. Being the bearer of a mail with the important news recently received from the confluence, and feeling that such a course would be the establishment of a most desirable precedent, I sought an immediate interview with the chief, and, pleading my haste, left Ilórin the same afternoon, reached Ogbáwmoshaw the following day (28th May), and thence despatching a special messenger, succeeded in forwarding the mail of which I was the bearer, by the steamer from Lagos of 7th June.

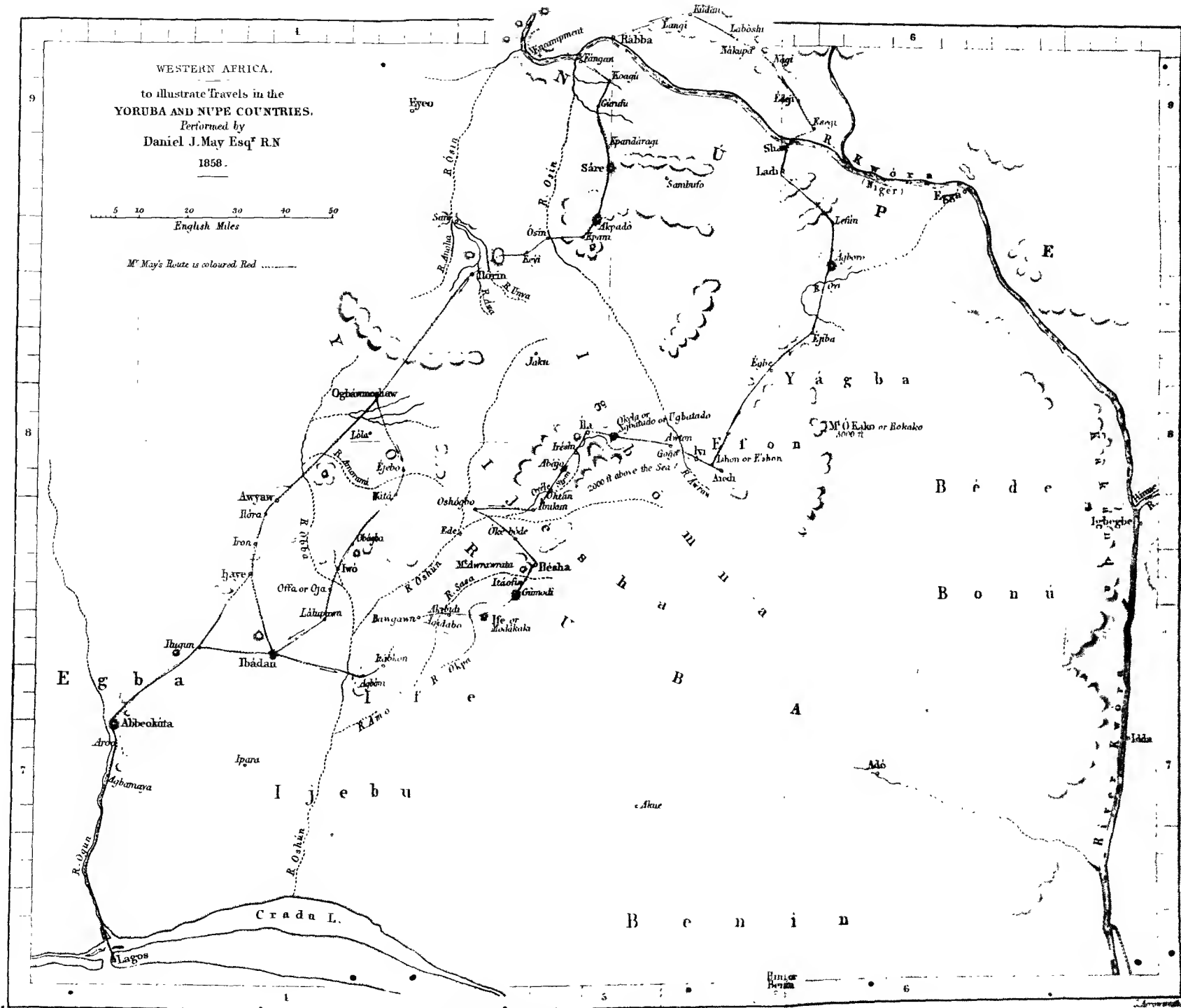
My interview with the chief at Ilórin was lengthy and satisfactory, continuing the familiarity adopted between us on my previous visit, my inclination and his curiosity and interest rendering it, I hope, both useful and instructive.

Resting at Ogbáwmoshaw until the morning of Monday, 31st May, I then set out for Ibádan, purposing to reach it by an eastern route, passing through a considerable town, Iwó. The first town reached was Ejebo, of a tolerable size, the approaches to which are broader and clearer, and the town itself is also cleaner and better arranged, than is usual. I here first met a functionary called an "Ajele," a resident representative of the power to which any town is directly subject, and who takes cognizance of all public matters transpiring. In this case, as in every town which I afterwards visited and found a similar officer, I had first to see him and explain to him my business and objects, and was then by him conducted to the chief of the town. Ejebo is subject to Ibádan, and the tolls taken in the roads approaching it are appropriated by that power. The chief received me kindly, gave me a kid and a few cowries, and assigned me quarters for the night. The next day's journey was to a farmstead, Obáigba, the road lying through alternations of the usual light forests or wilderness, and tortuous path

WESTERN AFRICA.  
to illustrate Travels in the  
YORUBA AND NUPE COUNTRIES.  
Performed by  
Daniel J. May Esq<sup>r</sup> R.N.  
1858.

5 10 20 30 40 50  
English Miles

Mr May's Route is coloured Red





through dense jungle. This place was once of considerable size, but, having been "broken" three times, has never recovered. It is now a farm to Iwó, which, on the following day (2nd June), I found to be but about 5 miles distant. Iwó is fully as large as Ogbáw-moshaw, very clear and clean, houses substantially built, compounds more compact, and the chief's house quite a wonder to me. The principal novelty in it was two covered porticoes engrafted on the house, supported by thick wooden carved pillars, and forming entrance and audience halls. This style, applied to the residences of chiefs and head men, became common on my farther journey. After considerable delay I was admitted to an interview with the chief, he and his household occupying one portico, his head man and myself the other. I found him an elderly, easy man, attired in a faded red damask waistcoat kind of garment, loosely wrapped about with a lady's white Paisley shawl, and a red velvet cap on his head. A large crowd occupied the space before the chief's house, to which I was an object of much curiosity, and which seemed, too, to be none diminished by my being the second white man visiting this town. My explanations proving satisfactory, after some conversation the question of housing me was discussed; it seemed to afford much difficulty, but was at last arranged. I was much struck with the apparent paucity of men at this place; the preponderance of females is always evident, but it seemed here to be greater than usual. In the evening I paid a more familiar visit to the chief, and made him a small present; and in leaving him and his town, left also, I think, the belief in the honesty and truth of white men and their intentions.

About 4 miles from Iwó I crossed the rocky bed of the Obba, now 2 feet deep, and about 60 yards wide; then journeying by a good road through an impenetrable forest, reached a clearance where stands the halting village "Offa;" then by a like road through like forest, reaching the village Lálupawn at 2 P.M., the end of our journey for the day. We had a tornado in the evening and early night, which would have been immaterial to our comfort, but that I had contented myself with a ju-ju house in the market-place, with no walls and a leaky thatch, for a lodging. Leaving Lálupawn at half-past 5 on the morning of 4th June, and travelling the whole way through cultivated ground, I reached Ibádan about half-past 10. Between Iwó and Ibádan palm-trees are particularly numerous. I found this route from Ogbáwmoshaw to Ibádan much frequented by traders taking sheep, goats, fowls, pigeons, &c., principally from Ilórín and the northward to Ibádan market.

I venture, my Lord, to digress a moment, to remark that one of the principal objects of the journey on which I had now set out was to endeavour to open up direct communication between Lagos or the sea and the trading post at the confluence of the Kwóra and

Binue. It was with this view I came so far down the country as Ibádan, as also that from there I had reason to expect being favoured with the valuable companionship of the Rev. David Hinderer, of the Church Mission, whose station is there; an inestimable advantage which, however, I did not enjoy.

Among the many large towns in the better known parts of Yóruba enjoying perfect independence, but paying a nominal allegiance to the king at Awyaw, Ibádan, approaching if not equal to Abbeokúta in size and extent, ranks unquestionably first in actual power: they are the soldiers, the fighting tribe of Yórubans; and of this I had perpetual and often painful evidence throughout my journey.

I passed the interval from my arrival at Ibádan until the 8th June under the hospitable roof of Mr. Hinderer, resting my horse and attendants, making observations, and collecting information about the country eastward. I learned that an army of Ibádan was in that direction, and knew that an army from Ilórín was also there marauding and rendering the country impassable; and all my informants were of opinion that this would obstruct my progress, which, indeed, proved to be true. I left the Iwó gate, an eastern one, of Ibádan, at 8 A.M. of the 9th June for Agbóm. After passing through the cultivated ground which extends for many miles around Ibádan, and then for some miles through forests, and after accomplishing altogether I estimate s.s.e. (compass), 15', we arrived at the river Oshún. This point is 5 or 6 miles below its confluence with the Obba, and here I found it a considerable river about 100 yards broad; we crossed in a canoe, and swam the horse. This river is the Palma of the charts, falling into the lagoon east of Lagos. It is reported to me to have many rocks in it, and that no canoes traffic on it. From this point of crossing to Ekpe (Kosokos' head-quarters) is a day and a half's journey; and notwithstanding this account of it, it may prove a practicable and speedier medium of communication with Ibádan and East Yóruba and the sea, during a short time of the year, than that by the Ogun and Abbeokúta.

Travelling about 4 miles farther south-easterly, we concluded a long day's journey by arriving at Agbóm late, an interview with the *Ajéle* and the procuring a lodging occupying the remainder of the daylight. My host was the head man next the chief, and he proved an hospitable one. The town wall of Agbóm encircles a vast amount of needless ground as uncleared as that outside it. This is not peculiar to Agbóm, but it was the first place I observed it: perhaps it is indicative of the expectations of its people. From Ibádan to this place the ground is everywhere strewed with mica, in the corn-fields, about the paths, and it enters into the composition of every stone. I was delayed at



Agbóm the whole of the 10th June from inability to procure a single carrier. The day, though gloomy as to weather, could scarcely be called a dull one; my host made a Sunday of it, which consisted (in that part of the process which was public) in drumming, drinking palm-wine, and eating kola-nuts, aided by changing parties of friends and visitors, all equally devoutly disposed. He gave me a kid, and otherwise behaved very kind to me.

On the morning of Friday, the 11th June, I resumed my journey, leaving Agbóm about 7 A.M. A good rising road for about 4 miles brought me to the village of Itáokon, from which place the remainder of our day's journey was along a muddy and intricate path through a tangled forest, and so tortuous as to render my compass of little avail, until about 3 P.M., when we emerged from this forest upon the small town of Bawgawn, our halting place. Again resuming my journey on the morning of the 12th, we passed over continuous cultivated ground, through many clusters of fan palms; passed by or through the small towns of "Agidabo," "Bágu-bágu," and Akibídi; crossed the streams "Sasa" and "Okpa;" and finally about 3 P.M. accomplished one desideratum of my journey by arriving at the much-talked-of town of Ife.

The task of collecting information, and especially if it has anything of a political character in it, is known to be difficult in this country. How much this would be increased, and how much its value be impaired, by passing through an interpreter whose knowledge of the English language is insufficient and his comprehensibility worse, I here and throughout my journey have painfully learnt.

Ife, the reputed seat of idolatry, a large town occupying much ground upon pretty hills, and surrounded by others, presents now no features to render it remarkable above other Yóruban towns. It is subject to and has an Ajéle of Ibádan-resident. The Mahomedan religion is common in it, and it is just emerging from a fierce civil war. On the death of a late king two factions arose—a legitimist against a slave party, which perhaps may be translated aristocracy versus democracy. The last king had been a scion of and secretly favourable to the latter party, having in his lifetime enriched them with much advice and warning as to what would probably happen at his death. The "slave" party have triumphed, and, occupying generally a large section of old Ife called Modákake, the name "Ife" is never heard; and that which should represent it is an extensive plot of ruins. My first visit was to the Ajéle, by whom I was conducted to the Modákake chief. He summoned his head men, and we had a long interview. The noise and crowd were excessive, for this was the first visit of a European,

and there seemed no ability to improve the matter. Having explained my business, a long whispering and consulting took place as to what would be proper to give me. A goat, kola-nuts, and a few cowries were presented at intervals. The old chief expressed satisfaction at my visit, gave orders about my lodging, &c., when I left, accompanied by the crowd before mentioned, after requesting permission to pay him another visit on the following day. In the evening the chief, with a few attendants, himself paid me a visit, bringing a present of eggs, &c. He is, I conclude, a weak-minded, spiritless old man, evidently the instrument of stronger wills; and he grew very importunate that I should give him some medicine "to keep the country good." It was in vain I assured him that honesty, justice, and truth were the only specifics. To the last he believed I had something in my pocket that would ensure it, and that I was restrained from giving it to him by a want of generosity.

The following day—Sunday, 13th June, 1858—I rested at this place, taking advantage of it to make observations, collect information, and look at the town. Induced by the discouraging information I obtained as to the probability of getting eastward, a route that would have enabled me to reach Benin for some time engaged my attention; but I decided that another, through Iléssha, the chief town of the Ijéssha district, would be preferable.

In consequence of some aggression, all communication between Ife and Iléssha had been stopped for seven months; a king's messenger, however, was appointed to conduct me and hand me over to the Ijéssha outpost. A youth having been with difficulty engaged as a carrier, I set out on Monday morning, the 14th June, from Ife for Iléssha. Leaving Modákake, we passed through the very extensive ruins of Ife, which are now slowly being rebuilt, whence the road is entirely up and down the pretty hills we see eastward from Ife, which road, being moreover for seven months an unused one, was often invisible, and always the most wearisome and worst I had travelled over. On leaving the district of Ife the micaceous ground and stone disappear, and a rich red loam takes their places. Having accomplished, I estimate, E.N.E. 8' (though now and in all these cases the actual travel is much more), we ascended another hill, on the top of which was the small village Gúmodi, and entered the district of Ijéssha. Much caution was observed in receiving me; but having satisfied themselves that, though unusual, my visit was honest, I was received with expressions of pleasure, and hope that my journey might be the means of re-opening the communication. In the presence of the head men there, I sent a message to the Modákake chief, which I hope and think probably did aid in the matter.

A stranger, from an enemy, was not to be lost sight of. One

of the head men of the village was deputed to conduct me to Ilésa, for which place, after an hour or two's delay, we set out. An equally hilly road, but by a better path, through most picturesque country, brought me to another village, Itaófa, where it was strongly insisted I should sleep whilst my approach was announced and permission obtained for my entering Ilésa: the object, as is not unfrequent in such cases, I knew afterwards, and so persisted in going on. By sunset we were very close to the gates of Ilésa, and at a cross-road my conductor now insisted on our stopping whilst he went forward to obtain the desired permission, &c. About half-past 7 he returned, accompanied by a messenger with a message of welcome from the authorities; so, forming a novel cavalcade, and guided by fire sticks, we approached the town. The gates were opened with much formality, and we proceeded through the quiet, dark, and deserted streets—if paths bounded by grass ten or twelve feet high can be termed such—through sundry ditches, or along rudely constructed little bridges, to the house of a head man next the chief. Here food was ready for us, which, in spite of extreme weariness, I was quite ready for; after which I was further conducted to the quarters appointed for me, the same as occupied by the Rev. Mr. Clarke, of the Yóruba American Mission, on his visit some months previously.

The 15th, 16th, and 17th June, 1858, I passed at Ilésa, which was a longer stay than I wished or intended, and less pleasant from the fact of my being almost a prisoner, as it is not permitted to a stranger to walk abroad until he has been received and recognised by the chief. It is the largest and by far the most important place visited by me after leaving Ibádan, and remarkable for the size and solidity of its houses and the intricacy of their construction; that of the chief occupies nearly a square half-mile, and is surrounded by a wall upwards of twenty feet high. The people of Ilésa have a wilder aspect than is common to Yórubans, produced perhaps by an increased amount of negro beard, and a practice of wearing calabashes for head coverings; the females wear a saucer-shaped button, the shank inserted in a hole in the left nostril.

Seeking information to guide me as to my farther route, I learned that a large town, Adó, lay three or four days' journey eastward, and so from its position precisely where I wanted to go. Although I could learn nothing certain on the point, I am disposed to believe that this town Adó may give a name to a stream rising near it, and be the same we know falling into the Kwóra, near Idda, with a similar name. Inquiries, messages, and food I daily received during my stay; but it was the second day after my arrival before I was summoned to an interview, and then only with the second

head man before mentioned. Everything was deemed by him and a few attendant head men satisfactory concerning me, except my farther proposed journey Adówards: this they pronounced impracticable, as the army of Ibádan was then engaged particularly against that town, and then formally solaced me by telling me that I should speedily see the chief and have his determination in the matter: as I suspected I had it then in his. On the third day, about 4 p.m., the promised interview took place. The chief's house is imposing in height and size, regularly built, and really looks a palace in Africa. After half an hour's waiting in an outer court-yard, surrounded by a numerous and anxious crowd, I was ushered farther into its recesses into a spacious square, with a piazza around it, where all was order and decorum, one end being occupied by the chief on a raised dais, with about twenty-four chiefs around him, all in state costume—the other, the sides, and the distant half of the square being filled by the squatting populace. A place was assigned me and my attendants also in the open square, but close to the chief and courtiers: no mat was offered to sit upon, in spite of my calling attention to the want by a very deliberate spreading of my handkerchief. The chief, whose name is Owá, is a tall middle-aged man, with an elongated oval-shaped face, forbidding and indicative of bad temper, his only regal distinction farther than his raised lounge being a coronet of small white cowries on scarlet cloth about his head: the second head man, the governor of the town, was the medium of communication. The conversation was merely a repetition of that with the governor. The chief expressed himself pleased and satisfied with everything—that trade should be established between his country and white men—that white men should come to Ilésia, build a house, live and teach his people, as at other Yóruba towns—but that I should go or try to go to Adó he could not approve of. This reluctance, so commonly experienced, to permit strangers to pass beyond a town or district, is attributable much to the responsibility a chief feels concerning you: he holds himself and is held responsible to an extent to the place from which you came, and in this case there was certainly much palpable reason for his non-compliance; but that it is more often attributable to the jealousy of chiefs and rulers, and was much so in this case, I am certain. The refusal to proceed beyond was distinctly made to refer not only to this instant, but to any future occasion. I was told that the only thing that was approved of on this head was that I should return whence I came; but, after some remonstrance, it was granted that I might do as Mr. Clarke had done, go hence to Ila, and I had no alternative. I made the best present my means afforded: it was far from an appropriate one, and I believe that my case might have been more favourably considered had I been enabled to make timely presents to the governor and an adviser or two. I was presented

with a kid and two heads (4000) of cowries; and the chief having requested and been favoured with a better look at me than our positions had afforded him, the interview terminated. I found two instances here of Sierra Leone people, sometime residents of Lagos, coming here to revisit their homes and friends, and learned and saw afterwards that such is frequent. From Ilésha, Ila is situated north-north-easterly about three days' direct journey; but by the route used is one of five. I wished to follow the straighter and shorter, but was not permitted.

At 6 A.M. of Friday, 18th June, 1858, I left my quarters in Ilésha, accompanied by a chief's messenger, and travelled north-westerly  $4\frac{1}{2}$  miles over a fair but rugged road to a farm village—numerous roads branching to farms indicating much cultivation in the vicinity. During this stage I observed an incident confirmatory of an opinion I had formed of the despotic character of the government in Ijésha. Meeting a woman carrying a large calabash of palm wine, my messenger (by virtue of his office) at once appropriated it, to the chagrin and loss of, but without the least remonstrance from, the poor woman, and freely dispensed thereof to all who would, when she was permitted to carry the remainder to our halting and breakfasting place for our farther refreshment. I made a present of its value to the woman, and requested my messenger to provide no such farther supplies whilst he was with me. A second short stage brought me to the small village but large market-place of Oke-bóde, where the chief's messenger left me, and rain detained me for an hour or so. Proceeding by a forest-road, still north-westerly, for about 6 miles, I reached the river Oshún, over which my party and our loads were ferried piecemeal in a large calabash, pushed and guided by a walking and sometimes swimming ferryman: a little above it flows over rocks; here it is about 50 yards broad, breast deep, and flows about 2 knots an hour. On reaching the north side of the river the road ascends and passes over open cultivated country, affording us a fine view of the hills from south to east, among which we had been lately travelling; the red loam of Ijésha disappears, and the usual gravelly soil takes its place. A farther journey of about  $2\frac{1}{2}$  miles occupied until 3 P.M., when I arrived at Oshógbo, which I found a good-sized town, but of rude and insufficient construction. Between Oke-bóde and Oshógbo is the line of division between Ijésha and Yóruba proper in this direction. A visit to the Ajéle (still of Ibádan) soon procured me quarters for the night.

On Saturday morning (19th June) I resumed my journey for 2 or 3 miles. I had a pleasant road over open cultivated country, and then merged into forest. When near I'bukun, where our day's journey was to end, I crossed a stream Oyéle, knee deep, running southward a day's journey into the Oshún, near a place "Lashi,"

through which a direct route from Ilésha to I'la would lie, and by which, as I mentioned, I wished to have come. After having travelled from Oshógbo, I estimate E. by S. 12', at 1 P.M. I entered the town of I'bukun, now a miserable and unimportant one, which seems to have much engaged the attention of the marauding powers, having been twice destroyed during the last three or four years. The Ajéle being absent in Ibádan, my interview was directly with the chief and his few councillors. I found them precisely such a party as one would expect to find in such victims of tyranny and oppression. The shattered and neglected aspect of the town, and the subdued and melancholy manners of its chief and his head men, gave me a painful idea of the effects produced by the rapacity of the two powers Ibádan and Ilórín. I had seen some of it before, and I saw more subsequently. The old chief entertained me with an account of many of the woes that had befallen him and his town, and, in spite of his misfortunes, he did not neglect to be hospitable. I was lodged in the Ajéle's house, and in the evening the chief visited me, presenting me with a goat, the shedding of whose blood upon the ground at the will, if not by the hand of a white man, it was anticipated would be productive of much good to their country. I condoled with him, thanked him, and made him a small present. One grows surprised, in passing from one town to another, all victims of and oppressed by the same powers, that a system of amalgamation against the common pest should not have been formed; but, as we know, to submit is a large element of African character.

On reaching I'bukun I had again arrived in the district of Ilésha. The following morning I set out from I'bukun for the next stage of my journey to Abájo. The first difficulty the road presented was a cutting about 6 feet deep, too narrow for a horse to walk on, and in one place obstructed by a tree fallen across it, under which it was with difficulty my unsaddled horse could be gotten. At a small town, Ohtan, we halted and breakfasted, where I paid a visit of courtesy to the chief, who gave me a few cowries and kola-nuts. There is another town of this name somewhat northward of this, through which Mr. Clarke passed; indeed that gentleman's route from Oshógbo to I'la was throughout more northerly than mine. Leaving Ohtan, we entered upon a very bad road, up and down steep hills, through cuttings of gravel and loam (peculiar to this day's journey), over protruding masses of granite, with bushes uncut, and the road itself often invisible—torn clothes, scratched and bruised limbs, being the results—until close to Abájo, where a mass of granite, insurmountable for horses, stopped me. I walked into the town, was conducted to the house and representative of the Ajéle (for here too that official was in Ibádan), and thence, after being refreshed with palm wine, to the house of the

chief, where I was well received in the midst of a very large, curious, and excited crowd; he was pleased with my visit, and satisfied with my purposes, and, after some conversation, assigned me quarters and gave me a goat. Abájo, about half the size of Oshógbo, is situated on the top of a granite hill, inaccessible for horses, except by a secret path; it is subject to, and has an Ajéle of Ibádan in it; it is rude in the construction of its houses, like all the towns I visited this side (East) of Ilésha, but appears to have enjoyed much, if not entire, freedom from attack, no doubt from its difficulty of approach. I rested a day (21st June) here for the benefit of my attendants and my horse.

At Ibádan I had heard of a great war-chief, E'shu, resident in this direction: now I learned more particulars of his whereabouts,—that he lived at a town, E'shon, three days' journey eastward of I'la, and was esteemed the most powerful chief in that quarter. A messenger and suite of his were now here (at Abájo), returning to him after a mission to Ibádan, to which power even he is tributary, whom I invited to visit me, anticipating some information; he came in much state with a host of followers and a vigorous drummer, one of the former flourishing two case bottles of Dutch gin, to which, as to some of their fellows, the whole party had evidently been profuse in their attentions, so that the visit, though sufficiently convivial (on the one side at least), was far from useful or interesting. I had no present to offer this man, which it would have been judicious to do, as he was to precede me on the journey, but I entertained him with kola-nuts. This poverty, but apparent meanness on my part, was not forgotten, but I found duly recorded concerning me on my subsequent arrival at E'shon. In these tributary towns a proportionate tax is levied on every house, which has to be paid every week, or, at farthest, fortnight, to the king, who transmits it.

I left Abájo for I'la on the morning of the 22nd June, descended the hill on which it stands, passed over a smaller one, and then travelled north-eastward still over hills to the village Iréshi, which was visited by Mr. Clarke; his route and my more southerly one here meeting a few hours' journey from I'la. Iréshi stands also on a hill, which we descended, still travelling north-eastward, passing over another hill, and crossing and recrossing a small stream running south-westward. About 1 P.M. I entered I'la, now the principal town of the Igbómna district, and after visiting the Ajéle was duly installed in lodgings.

This district of Yóruba is small in extent, and rich in the production of cotton; the principal chief in it was he of a town, Owú, north-eastward from this, but recently he has become eclipsed by the chief of I'la. As I purposed continuing my journey in the morning, I sought and obtained an interview with the chief soon after my arrival; his house I found large, well kept, and substantial,

with the before-mentioned portico construction, a contrast to the rest of the town, which, though extensive, is rude. I was received with much formality and decorum in the presence of a large but quiet assembly of head-men and people; the chief was richly attired in a red plush or velvet waistcoat, with a mass of white satin wrapped and lying around him as he sat. I told him I was on my way to E'shon (having, after obtaining all possible information, determined on this). I told him (as I had done on all previous occasions) of our trading establishments at the confluence, and objects; the whole met with universal approbation, and a ready and cheerful assent to an inquiry I had embodied as to their wish to have "white man live among them to teach them book," &c. I was presented with a goat and two heads of cowries, but not having expected so ostentatious and official a reception, I was unprovided with a present in return; and on a subsequent comparison between my remaining stock and the journey before me, I felt it would be imprudent to attempt a remedy. Since my visit to this district of Igbónna I have heard of it being in contemplation to take measures for the promotion of the growth and trading in cotton there; that the district plentifully produces it I can affirm, but I would diffidently submit that it needs examination to prove that it is more productive than neighbouring districts, or at least sufficiently so to compensate for the far superior means of transport found elsewhere in conjunction with the commodity.

I left I'la on the morning of 23rd June, after much difficulty about my loads, my poverty in presents having prevented my sufficiently cultivating the goodwill of the Ajéle to obviate it. We travelled on a level road, soon merging into the usual lightly-wooded forest, with a narrow and uncut one, passing at intervals through open patches and through grass 16 to 20 feet high, until at last emerging from this forest we burst upon an open and unusually pretty piece of country; stretching away at my right hand, a dark mass of thick forest covering a high and even range of hills; before me, and towards my left, a cluster of bright green hills, with scattered palm-trees on them; and knots of thicker bush in ravines at my feet, through which flows a small clear stream. This was my entry upon a style of country through which, and still more picturesque and charming, I afterwards travelled in the districts of Efon and Yágba. It confirmed an opinion my journeyings had induced me to entertain, viz. that a belt of thick forest generally intersects Yóruba between the parallels  $7^{\circ}$  and  $8^{\circ}$  N., and which disappears beyond those limits. The road lay among the green hills before me, and thence by a steep and rugged road over the range to the right; soon after which, about 1 P.M., I arrived at a place, Ngbatado, composed of ex-inhabitants or fugitives from oppressed quarters around. It is small, agricultural,



and has an Ibádan Ajéle in it. Though we had accomplished, I estimate, E.S.E., but 6' from Ila, the road had so tired my horse and party as to render this a most desirable conclusion to our day's progress.

I set out from Ngbátado on the following morning, the 24th June, for Awton, after much delay and sundry messages between the Ajéle and the chief to procure a carrier. This want seems trivial, almost absurd, to cause so much trouble and delay and demand my remarks so often. After leaving Ibádan I never found a professional carrier, though they are common and universal on the trunk road through Yóruba (from Núpe to Abbeokuta), but an individual had always to be procured as a favour from some official or head man, and then excessive payment was expected. I moved through open country with high grass, then by a bad and tortuous road through forests, and, finally, through more open country into an excellent avenue-like approach to the town Awton. In all, I estimate E.S.E. 10 miles.

Awton, surrounded by a very deep ditch, was of considerable size until about five years since, when it was attacked and partially destroyed by an army from Ilórin. It was not, however, subjected, still paying tribute only to Ibádan now. Many of its former inhabitants who had fled have returned, and the place is becoming restored. It is the boundary town between the district of Igbómna and Efon, and from it there is a frequented route of five days' journey to Ilórin. All my inquiries about the route eastward to the Kwóra were met here by accounts of the "war in the road," ominous shakings of heads, and representations of much danger. I hoped I might find no greater obstacle in the will of E'shu at E'shon.

On the 25th June I left Awton, and proceeded by a good road for 2 or 3 miles to the small town "Gogo," which we passed through. Continuing our journey, we crossed a stream, "Awraw," running N.W. about 3 knots, breast deep, and 20 yards broad; were well wetted in a thunderstorm; and arrived at the gate of a town, Jesháya, where a deep ditch, with but a narrow crooked plank across it, involved a circuit among the farms until I regained the road beyond the town. A messenger overtook me, conducting me in this circuit, which had to be immediately repeated on approaching the town of "I'yé," which is similarly unapproachable for horses. Next, arriving at the half-filled ditch of a ruined town, my horse, attempting the usual passage of horses there—down into and up out of it—worn and well tired, fell back, and, though not much hurt, caused much trouble and delay. We concluded our day's journey under an unusually hot sun, most unpleasant after a good wetting, by arriving, about 5 P.M., at E'shon, the difficulties and delays of which had been

magnified to me by my having been very unwell throughout it. The road had been open and hilly, through a little forest and much long grass.

I visited the Ajéle, but felt too unwell to move farther to see the chief. This was a matter calling for deep consultation and suspicion, but I was now positively ill for the time, and at last I was assigned lodging without the preliminary visit. I sent Wm. Reader to announce my arrival and "make compliments" to the chief, who, accompanied by a messenger from the Ajéle, was received by my acquaintance the messenger from Ibádan, who must have been still under the influence of a Dutch case-bottle, judging from their reception: indeed, that excuse was next day made to me for its uncourteousness. E'shon and A'iedi are nominally or politically one town; really they are two, and about two miles apart. In the former the Ajéle resides; in the latter the chief E'shu is to be found, and, as its formation is recent and it is now very select, I imagine it is a compromise with the feelings of the reported fighting man who governs, subject, however, to Ibádan. I remained at this place during Saturday the 26th June, in the forenoon of which I was summoned to E'shu at A'iedi. I found him and his assembled head men waiting for me: he, a very black man, was seated on a dais, on a fine leopard's skin, under a piazza on one side of a spacious square, and a rather select crowd filling the other and sides. The salutations over, I was desired to seat myself under the piazza opposite him, and our conversation was then conducted by a party of three or four running between us. After the usual explanations, I had to approach the matter of my proceeding, when I had to learn (politely enough conveyed to me) that the road eastward to the confluence was shut to me; "war in the road" was the farther information on my attempting to shake the chief's determination. He pointed out to me that I could proceed towards "Ládi," which is five days' journey from E'shon, and by which I should more easily reach my friends at Rabba. I had no alternative but to adopt this route, accept his proffered messenger to the next town, E'gbe, and so relinquish the hope of reaching the confluence or visiting the Kakanda districts. I did not, and do not now, feel that I have reason to complain of this determination of E'shu, believing as I do that his reasons bore more reference to me and my safety than anything else. He gave me a goat and some kola-nuts, and I made him the best present in my power; but I have a strong belief that my movements from this point might have been different, could I have been provided with even an ordinary supply of materials for presents. The interview, which had thus not unexpectedly prostrated my hopes when within not more than 50 or 60 miles of the confluence, now terminated.

I estimate that one-third of the men assembled in and about the courtyard were nursing case-bottles of gin in various stages of dissolution, brought recently doubtless from Ibádan; this I esteem no sign of unusual intemperance, but simply of the excessive estimation in which they hold this European commodity; still to me it seemed abundantly ridiculous.

E'shu is the principal chief in the district of E'ffon. We passed out of the north gate of E'shon soon after 6 A.M. of the 27th of June: two or three rough small trees formed the only passage across the ditch, in crossing which my horse fell and became so disabled as to necessitate my walking, for which my strength was very ill adapted. Throughout the day I had a good travelling road winding about hills; crossed the A'íye, a small stream running northward; had a fine look at Mount Rókoko, east south-east of our route, which I estimated to be 3000 feet high, an unusual height, and the highest of a range in that direction in Yágba; endured two heavy thunderstorms; and on approaching E'gbe the aspect of the country became still more picturesque, and even parklike. Clusters of stony hills, with bright green and woody patches on them, grass of a softer character superseding the usual rank sort, careful cultivation, and boundary hedges of tall euphorbiæ, with our north-westerly and westerly horizon bounded by a high range of land and many hills, some exceeding, I estimate, 2000 feet in height, were the features which contributed then, but which I now find in mentioning do little towards making up the un-African scenery the country about E'gbe presented. At sunset in the midst of a thunderstorm, having journeyed I estimate 24 miles, and accomplished N.E.  $\frac{1}{2}$  E. 18', I entered the town of E'gbe, situated on the slope of a hill and surrounded by other hills, in the district of Yágba.

At this place, of necessity, I rested two days. I was hospitably received into the house of the old chief. This town consists of two distinct parts, approaching the style of the towns on the Kwóra in rudeness and closeness of construction and general foulness, and showed a curious amalgamation of the round-built houses of that locality with the square, characteristic of the interior; and as a farther symptom of approach to the river I observed armlets of plates of ivory superseding the solid ones. There were large droves of cattle, but no milk could be procured.

The town I had left (E'shon) is the limit eastward of the recognised authority of Ibádan. This town (E'gbe) I found enjoying a most unusual amount of political freedom; it had no Ajéle in it, and was entirely subject to no power, for which privileges the price was, tribute to its strong neighbours at E'shon, to Ilórín, and to the king of Núpe; the next town on my route I found entirely subject to, and with an Ajéle of the latter in it. The old chief

during my stay treated me with much kindness: he gave me a sheep, periodical messes of food, and lastly two heads of cowries. My stay here afforded me opportunities for observations, and better fitted us all for our farther journey, which we set out upon on Wednesday morning, 30th June. After a repetition of an old difficulty, the passage for horses across the town ditch, a difficulty which of course is not accidental, but politic and universal in this part of the country, we proceeded on our journey by a good road through open, picturesque country, with hills, green knolls, perpetual cultivation, and constant clusters of huts—a feature peculiar to Yágba, and almost unaccountable in such a well-hunted and harassed locality: it is, however, doubtless assignable to the extreme productiveness of the soil more than counterbalancing the impending dangers in the estimation of these naturally parsimonious people. About noon, having travelled, I estimate, E.N.E. 9', we arrived at a cluster of houses which, to my surprise, I found was E'jeba, a town I had expected to reach only after a long day's journey. My escort to E'gbe had consisted of three armed men; that of to-day, from it, of half a dozen. I was announced to, and met outside the town by, the Núpe Ajéle, and by him conducted to the chief, a man of whom one description will serve for himself and his town—they were both old, small, and unimportant. I was comfortably lodged, however, and a goat, a mess of food, and a few cowries were brought to me. About 4 P.M. there was great excitement produced by the arrival of the news of a party of people belonging to a neighbouring town, "A'ghoro," having been attacked and carried off by a party of Ilórin people. There was much noise, arming, mounting, and sallying forth, the searching party returning soon after dark without any result. This is the occupation and mode of procedure of the army from Ilórin here, as of Ibádan and Núpe or any other power anywhere else on a marauding and slave-hunting expedition. The effects in this beautiful and productive district were lamentable to perceive; doubt, fear, suspicion, forced neglect of agriculture, stoppage of trade and communication, misery and sorrow consequent on the bitter violation of the better feelings of humanity (and the more bitter here, where we find so much development and sensibility of the affections), are the more prominent: the latter I was painfully brought in contact with the following day, when I passed the sad group of bereaved and mourning relatives sitting under a sacred tree. I found the strongest conviction in the minds of these people that "white man," and even I alone, if I would, had the power to eradicate this evil and "make the country good." I invariably disavowed any such power, both on my own account and that of my colour, but I think I never affected their strong belief on this point.

My journey the following day (1st July) was adversely affected

by this kidnapping, thus :—I set out from E'jeba with a messenger and a carrier, and we moved eastward to an E'jeba hamlet, where they were changed, and we proceeded on another stage to an outermost hamlet, whence I found we must proceed without either. The old head-man and some dozen others, whom the small village and nearest fields supplied, accompanied us for some distance until we reached the river Oyi, where they entreated me to wait, as a large armed party were expected, with whom I might travel in safety to A'gboro. We forded the Oyi, which is the most considerable stream I met throughout my journey; it was here about 200 yards broad, 4 to 5 feet deep, flowing north-westerly, and falls into the Kwóra at or very near E'gan (Egga). Some few miles farther on my road we again crossed this river, flowing eastward this time, with a current of three knots, which made me aware of the impotence (after constant riding) of my legs by sweeping me down the stream. At the first ford the armed party (whose business to A'gboro had no reference to me) came up, and in their company we continued our journey. The road generally was level and stony, through lightly wooded country. We arrived at, examined, and passed the spot of the previous day's kidnapping, broken calabashes, torn garments, trodden grass, &c., showing us the scuffle that must have occurred; whilst here and there were traceable the paths by which some individual unfortunates had endeavoured to escape their captors by running into the bush. The armed party throughout the journey were facetious, loud, and derisive of the enemies not to be seen, and who no doubt were prudently far from the spot, on whom they vehemently called, and with whom they would pretend to be fiercely fighting, stringing their bows, drawing an arrow, and rushing from their path in among the bush for this purpose, singing all the time rude songs, evidently self-laudatory. All this exhibition was intended to excite my admiration and astonishment at their prowess. About 3 or 4 miles beyond our second ford of the Oyi is the town of A'gboro, the houses of which looked like large stones on the top of a bare stony hill, in a range of hills: it is equally curious and miserable, but I was glad nevertheless to reach it after a tedious day's journey, having accomplished, however, I estimate, N.N.E. but 12'.

From A'gboro I continued my journey on the following morning (2nd July), still on a level road, hills now disappearing, and the country assuming an aspect and covering similar to that between Sára and the river, north-westerly from this. A short and pleasant journey brought us to the small circular-shaped town with entirely circular huts, named Léfun, no doubt from its position "en route" with reference to the tributary of that or very like name examined in the *Dayspring*, and which falls into the Kwóra opposite and

near it. This place is very inconsiderable, and, like many others, difficult for horses to get into.

On the 3rd July I resumed my journey, after delaying the usual time (an hour or so) whilst two young men, bows and arrows, &c., were being provided. A good road, over open, undulating country, lightly wooded, N.N.W. about 7', brought me to the ruins of the town of Ládi. From its situation on a gently sloping plain I was afforded a most comprehensive view of it; and its contemplation during a ride quite through it afforded food for much and sad reflection. Ládi became famous as the head-quarters of Dasába after he had destroyed Rabba and wrested the government of Nùpe from his half-brother in 1845. It in its turn was soon after reduced to the ruins I saw it, and the usurper driven into exile. At the extreme north edge, within the wall, is the small village, the present Ládi, where I halted for about two hours waiting for a guide and carrier to the river four or five miles distant, and at last was obliged to proceed as best I could without either. After moving about N.E. by N. 4', I arrived near dark at half a dozen huts on the right bank of the Kwóra, nearly opposite the large town "Shaw" (Tsua), situated on an island in the river. The chief of this town has the title of "Kúta," or "River King:" he controls all matters relative to canoes and the river in this part, and his island is a perfect dockyard and dépôt for the former.

I had looked forward to this as the termination of my land travel, expecting hence to reach Rabba in about three days per canoe. I was ferried to the island the next morning, and obtained an interview with Kúta, whom I found a fine, stout, good-looking man, and then in council with his head men. I told him where I had started from, where I had been, and what I now wanted from him, which met with a peremptory though not uncivil announcement that I must go by land. I had no alternative, and, although my horse much needed rest, "Shaw" was much too little attractive to delay there; so, in half an hour from the time I had landed on the island, considering my journey done, I was crossing the few yards of water only which now separated the island from the left bank, with a three or four days' farther journey before me to Rabba. From the bank of the river at this point there is a fine view of the Rennell Mountains on the right, and the nearer range, the "Earl Grey," northward and before us. Towards the latter our road bends—a very circuitous one—through the low swampy ground bounding the river, through swamps often 3 or 4 feet deep, and across a lagoon in a canoe, until we reach somewhat more elevated ground and are near the base of the range, where is situated the small town of Eseji, by bearing and estimation N.E. 4' from the bank of the river at "Shaw." At this place I was received by an

unusually young and hospitable head man, who took much trouble to furnish me with the best Esejí afforded. I was much struck with the transition, on crossing the river, from guns, bows and arrows, and universal insecurity, to turbans, Mahomedan insignia, undisturbed industry, and apathetic contentment.

My kind host, the chief, said he could not furnish me either with a guide or carrier, but he himself was mounted, and accompanied me some 4 or 5 miles on my journey when I set out from Esejí the following morning, Monday, 5th July: he was a most intelligent, inquiring, and pleasant companion. I had made him a small present, and we parted with expressions of much mutual friendship. I found the road excellent, running parallel with the range of hills on our right and generally about 3 or 4 miles from them, for the most part through corn-fields now almost ready for harvest. I halted in the small town Edeji, saw many guinea-fowls about the corn, passed endless anthills, unusually high and curious in their pinnacled and turreted construction, and after having travelled, I estimate, N.N.W. 12', completed my day's journey by arriving at the small town "Nagi," lying between hills on our right and left. I was kindly received here, lodged in the house of the chief, and hospitably served.

The next morning I left "Nagi:" the road wound round a hill, with a barren and stony crater-like summit, with volcanic stones and matter upon its sides and at its base; then up another, steep and rugged, which afforded no reward, however, in the shape of a look at the surrounding country; along its table top, and down its equally steep and rugged opposite side; and lastly along a level cultivated valley to the village Nakupá, where I halted and breakfasted. Resuming my journey by a good and level road through almost entirely cultivated country, after making in all about N.N.W. 9', at 11 A.M. I arrived at Labóshi, a good-sized town, which had been pointed out to me as the end of my day's journey. I found the chief under a tree in company with his head men—a stout, inert man, whose occupation and delight seemed to be copious snuff-taking, after the manner of the country, viz. placing about a spoonful between the lower lip and gums, his snuff-box being a very capacious cylindrical vessel, ornamented with silver and ostentatiously displayed. I was very unwilling to halt for the day at so early an hour, and, after much pressing and debating, succeeded in engaging a carrier for another stage to Kúdan. It was shrewdly argued that, as I had paid 500 cowries to a carrier to come here, scarce half a day's journey, I could not but pay 800 to another to go a longer half, and to this arrangement I was compelled: 600 or 700 cowries is the average wages of a professional carrier for a good day's journey, where they are attainable. Labóshi consists of two distinct parts, separated from one another by a small ravine

and stream, across which is constructed a viaduct, about 30 feet high in the centre, quite passable for horses, and which to me was a wonder. I have nowhere else met with such a display of ingenuity; it is quite a distinguishing mark for this town. I was esteemed a great curiosity here, and during my stay was surrounded by half the population at least. A very uninteresting road, through light forest, N.N.W. 8' I estimate, took me from Labóshi to a clean and orderly-looking town, whose name I could not learn, from which south-westerly a mile or two brought me to Kúdan.

Since coming into Núpe I laboured under a farther impediment to the amount and accuracy of the information I collected, in having no one who could speak that language. Kúdan is a little place, in which, on my arrival, I could see nobody; but having discovered its chief, he kindly provided me with good lodging, and in due time an excellent mess of food. On the following morning, the 7th July, on going to him to bid him good bye, though an early hour, he had another and similar mess ready for me. I gave him the only approach to a present I had, and left Kúdan.

A short stage by a good level road through pleasant, open, and cultivated country, brought me to a small town, Jángi, approached by a viaduct, similar to that at Labóshi, across a swampy dell, where we halted, changed carriers, &c., and then proceeded on a long, uninteresting journey, through the usual light forest, affording no peep beyond, until, reaching the edge of the plateau on which I had been travelling, I got a view of the river below Rabba, descending by a rugged path, and after passing over several intervening ridges, soon after 1 P.M. reached the gate of that town. From this gate (the eastern one of Rabba) it is an hour's ride to the river's bank: the entire space being filled with the ruins of the old town, show the once very considerable size of it, and again, as at Ládi, set me pondering what had become of the many thousands, harmless and homeless, who had once peopled it, and on the desolation so plentifully sown through the ambition, wantonness, and cruelty of the aspiring and disputing rulers of this unhappy country. My journey was thus virtually completed. I rested a day with the Rev. Mr. Crowther at his temporary mission premises, and the necessary arrangements during it having been effected, I reached our encampment on the Kwóra on the 9th July.

Having thus completed a detailed report which has, I feel, become both too lengthy and too monotonous, for which the apology I would offer is, my anxiety to afford the fullest information, I would yet humbly beg your Lordship's farther patience whilst I append a brief summary. Premising that the haste which I was obliged to exercise on this journey precluded that quiet and complete observation desirable on such an occasion, besides endangering both the cordiality of one's reception and the establishment of



favourable opinions, I have to observe that, setting out from Ibádan, I first crossed the river Oshun, the value of which as a means of transport, &c., is unknown : I then entered that district of the great Yóruba country called "Ífe," which I found suffering from very recent and severe political commotion, which had ended in the substitution of a new ruling power. The town of that name I found quite undeserving in every respect of that notoriety which has hitherto been attached to it. I then entered the district of Ijéshe, the most hilly, the most powerful, and most important of any eastward of Ibádan, and one which, from the jealousy and narrowminded policy of its rulers, I would point out as desirable to remain unvisited by any one whose object may be solely to explore anywhere beyond it. Journeying north-eastward, I passed out of Ijéshe into the less extensive district of Igbómna, the principal town in which is Íla ; here I found more liberal views and a strong and universal desire to cultivate the acquaintance and obtain the permanent presence of "white man." This is the district which has been spoken of as highly productive in cotton, on which I have already remarked. Up to this point my journey cannot claim perfect novelty, the Rev. Mr. Clarke, of the American Yóruban Mission, having passed through many of the places I had visited on his visit in November, 1857.

Passing out of Igbómna, I entered the district of Efon, and reached its principal town "E'shon," or A'iedi, from which the confluence of the Kwóra and Binue lies nearly due east and distant not more than 50 or 60 miles ; this was the nearest approach I was able to make to that object of my journey : the difficulty and doubt of my succeeding had been pointed out to me at Ibádan, the cause assigned being the presence of a slave-hunting army in the locality I need pass through ; this was now verified, the chief refusing me to proceed in that direction, his motives being I believe not illiberal. Up to this point the country was of much sameness of character, thickly wooded with impenetrable jungle, or at best occasionally a lighter forest, except in the vicinity of towns and habitations or where their cultivation may have extended.

I was now also about E.N.E. (true) 120° in a straight line from Ibádan, and obliged to direct my steps to the banks of the Kwóra, nearly due north of me. I passed out of Efon and entered upon country with much changed features, affording a great relief in travel ; it now became, and continued, open, picturesque, and often park-like, and must be described from the parallel of 7° N., extending northward, at this distance from the river, as a beautiful hunting ground for Ibádan, Ilórin, and Núpe, the hunted being its in-offensive and weak inhabitants ; such a perversion is painful to see, and its effects are as lamentable. That part of this country which

I had now reached is called "Yágba;" eastward and adjacent to it is Bède, adjoining which is Bonú; both which latter belong by virtue of their language to the district and dialect which we are pleased to call "Kokánda." The Kokánda of the natives, however, has more circumscribed limits.

"Yágba" is the most productive and most beautiful district through which I passed, with the peculiarity of isolated dwellings which I nowhere else observed. Passing northward out of Yágba, I entered the territory of Núpe (often called Tákpá), and shortly after reached "Ládi," a town famous in the modern politics of this country, now a vast extent of dreary ruins, from whence the river is distant about 5 miles. I crossed, having reached it at "Shaw," a few miles above the junction of the tributary "Lefún," and, after three days' journey on a good road, reached Rábba.

Throughout the journey I met with much consideration and hospitality at almost every place: a goat, or a sheep, and a few cowries were given to me, even where I met comparative poverty and much depression; yet parsimony, with shrewdness and industry, are the prevailing characteristics. The latter I have always thought should be qualified by the adjective "African," for it has never been my fortune to see in Africa the quality known to us by that name.

I everywhere distinctly and impressively pointed out the efforts Her Majesty's Government were making with a view to establishing a trade and otherwise improving their country, which invariably met with approbation and a firm belief that "white man" had but to will it to effect the same.

Corn, yams, and cotton are the principal productions, palm-oil being only prepared for their own moderate consumption. The country is evidently capable of producing a vast amount of these commodities. The shea butter-tree disappears almost entirely on receding from the river.

Very contrary opinions are held as to the best time of the year for travelling in "Yóruba;" some persons of long experience in the country give the preference to the months of August and September. In May and June I found these advantages: a cool and cloudy atmosphere, rarely rain in the day, and that by night rendering travelling more agreeable and refreshing, and the streams offering very little impediment from their volume. The first, in my case, was often not an advantage; it prevented, on many occasions, my obtaining desirable astronomical observations, on which head I have the honour to report to your Lordship my hope and belief that the data I have obtained will yield a reliable map of the parts I visited. My barometrical observations will, I trust, yield a chain of elevation of my route; the plateau from

Abájo to I'shon is the highest above the level of the sea I passed over.\*

My brief experience prompts me to point out the absolute necessity of an ample supply of material for presents on a journey manifestly for exploration; my deficiency in this respect certainly affected me adversely on very many occasions, and I believe the results of my journey would have accorded more with my intentions had it not existed.

Finally, I would beg to bring to your Lordship's notice the hospitality, kindness, and aid I invariably received from the reverend gentlemen of the American Mission in Yóruba, as well as from those of the Church Missionary Society of England, particularly amongst whom I am indebted to the Rev. H. Townsend at Abbeokuta, and the Rev. David Hinderer at Ibádan.

I append to this report a rough preliminary map, which I intend merely as an aid to comprehension in its perusal. Sincerely trusting that my humble efforts and their at least partial success may meet your Lordship's approval,

I have the honour to be, my Lord,

Your Lordship's most obedient servant,

DANIEL J. MAY, Second Master, R.N.,  
Of the Niger Expedition.

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XX.—*Memoranda of a Trading Trip into the Orange River (Sovereignty) Free State, and the Country of the Transvaal Boers, 1851-52.* By JOHN SANDERSON, Esq.

LEAVING P. Maritzbourg, the road ascends the Townhill, a deep outlier of the Zwartkop, so called from the masses of wood that clothe its sides near the top and fill its ravines. Once arrived at the top of the Townhill, you pass a succession of grassy undulations for many miles (in fact, to the top of the Drakensberg), perfectly bare of trees, excepting a plain a few miles in breadth near the Blue Kraus River, and here and there in ravines or along the course of streams. Crossing the upper Umgeni a few yards only above the falls, said by the late Dr. Stranger and others to measure 270 feet in height,† you continue through this bare undulating country to ascend upon the whole, passing successively the Mooi River and Bushman's River. The soil as you ascend from the banks of the former is covered with boulders and other blocks, jagged and of very marked character, with abundant evi-

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\* I have since computed this to be 2000 feet above the sea.

† A friend told me lately he had measured the fall, and found it 332 feet in height.

dence of the presence of iron. Long level tracts intersected by beds of streams, many of them presenting in miniature the model of the broken district of Natal; table-lands with precipitous edges; sharp ridges running out from their sides and branching in every direction—here an isolated peak, there a chain of tiny mountains; nothing could better illustrate the action of water in shaping the face of a country. In the rivers I saw small turtles, and near the Bushman's River picked up a tortoise about 8 inches in length. All along this road, and onward beyond the Bushman's River and the Tugela, you travel nearly parallel with the Drakensberg, whose sharp jagged outline, of tolerably uniform level on the whole, rises like a wall against the western sky. It was interesting to observe on its sides, blue with distance, the marks of stratification, continued mile after mile, apparently perfectly horizontal, and broken only here and there by some gully, to be resumed on the farther side and carried in parallel belts as far as the eye could reach. Descending on the farther side of the Bushman's River, upon a plain sprinkled with the whitethorn acacia of the Boers, you pass the Mord Spruit, and a mile or two farther the Blue Kraus River. The ominous name of the former (Murder Brook) is a memorial of a fearful massacre of Dutch emigrants, chiefly women and children, which took place here in February, 1838, immediately after the butchery of Retief and his party by Dingaan. This country must at one time have been densely peopled, as there are the remains of hundreds and hundreds of stone fences from 10 or 12 feet to 20 or 30 yards in diameter, circular, but mostly without any apparent entrance. The country here is very beautiful, especially on the banks of the Blue Kraus, which are shaded with trees; among these I observed two kinds of willows. The Tugela at the "drift" or ford is a couple of hundred feet in width, flowing over a shaly bottom between high steep banks. After crossing, I took by mistake a path to the left, over a hill covered with loose stones and boulders in thousands, on through a dreary, treeless country, till at sunset I reached Meyr's Hoek, a solitary farmhouse among the hills at the skirts of the Drakensberg. On the following morning, crossing the Little Klip River and one or two other little streams, I reached towards afternoon De Beer's farm, the last in Natal, where I stayed for the night. This house lies at the foot of the mountain, which hereabout first presents an accessible slope. The ascent, although long and laborious, is by no means so bad as I expected, and from De Beer's occupied me, easy riding, not more than  $1\frac{1}{2}$  to 2 hours. Almost at the edge on the top is a wall of loose stones running from one hilltop to another across the road, and which I was at first inclined to consider a work of art. This I found was the boundary of Natal. I found as I proceeded scores of walls similar,

To accompany a Trading Trip into the  
**ORANGE RIVER FREE STATES,**  
*and the Country of the* ●  
**TRANS-VAAL REPUBLIC,**  
 in 1851-52.  
 By John Sanderson Esq<sup>r</sup>

To accompany a Trading Trip into the  
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W. Sanderson's Route  
is coloured thus —

English Miles.

Wittebergen or White Mount.



presenting a very marked feature of the scenery above the Berg, netting the country as they did in all directions. They are basaltic dykes; sometimes rising, like this one, a foot or so above the ground, in the shape of loose blocks; sometimes only indicated by a gentle rise on each side to a sharp ridge, uniformly marked by a fresher green than that of the surrounding vegetation. Once at this height, the ascents and descents are but trifling; the road winding through valleys of a very singular character, until you emerge on the rolling plains of the Sovereignty, or, as it is now called, the Orange River Free State. It is to be observed that the Drakensberg is not a mountain-chain ascended on the sea side to be descended again on the inland side, but rather the abrupt face of a plateau, sloping up, as I am informed, from the western side of the continent \* to within some 60 or 70 miles of the Indian Ocean, when it suddenly descends in a succession of terraces more or less distinctly marked. This rapid descent accounts for the different climates of Natal, from the temperate regions of the upper districts to the almost tropical character and vegetation of the coast, as well as for the rapid course of its rivers and the almost entire absence of alluvial plains along their course. The Drakensberg, from the land side, presents the appearance for the most part of a series of perpendicular flat-topped hills rising out of a mass of *débris* at their foot. Many of these perpendicular cliffs are wasted till nothing is left but fantastic peaks of the most wonderful variety of forms. Riding along, one cannot help tracing resemblances to well-known objects and naming them accordingly. But the majority have undoubtedly the appearance of fortresses crowning hills of every dimension; some resembling a mere border-keep, others far surpassing in size, while reminding you of lordly Heidelbergs and Ehrenbreitsteins. Farther inland, these sandstone cliffs were crowned with basaltic columns, strongly contrasting to the eye with the apparently perfectly horizontal stratification below. Crossing the Wilge River, at the foot of one of those isolated mountains, called Nelson's Kop after some colonial hero or horse, I believe, not after "the hero of the Nile," you meet with only rills or an occasional chain of pools connected in the rainy season, until you reach Harrismith. Winding amid these valleys, the road passes over a "neck" to the westward, and, sinking sharply to the left, you reach at length the town at the very foot of the Plattberg—the hill you have just skirted on three sides. At the time I visited it, Harrismith consisted of some 25 to 30 houses, laid out on a regular plan, with water led through the main street. The situation is bare and

\* Since penning the above, I have seen Dr. Livingstone's Travels, and noted his description of the interior of the continent as a vast basin or valley, rising east and west.

inhospitable in the extreme—subject to high winds and fogs, and firewood so scarce, that, as I was told, it costs even a small family 1s. per day. Still the situation on a main road between Natal and the interior is good, and it is likely to progress. The Plattberg, which I ascended, and found to be nearly flat, with here and there a little mere or pool on the top, I estimated at some 400 feet above the neck, and 600 to 700 above the village. Of this height, probably 50 feet consists of the perpendicular basaltic palisading I have described as crowning many of these hills. The village appears to lie in an angle formed by the Drakensberg and the Wittebergen, between which the view westward and north extends over the naked plains of the (late) Sovereignty, broken only by two or three peaks, the last solitary outposts of the Drakensberg. Half a mile from the town flows the Wilge River, the same stream we have already crossed, and which, after a north-westerly course, runs, as all the streams in this quarter do, into the Renoster River, a large tributary of the Vaal.

On 2nd December, 1851, I resumed my route, which, after crossing several petty streams, at a distance of about 30 miles from Harrismith, reaches the Eland River—a stream of excellent clear water, flowing between banks 20 to 30 feet in height, and overlooked at the drift by a range of hills on the western side, one of them of very fine bold outline. On a flat, to the left after crossing, is the site originally laid off for the town of Harrismith; but abandoned, I believe, chiefly because of the difficulty of leading out the water. All the maps I have seen place the town, however, at this spot. After crossing three small spruits or streams, the road to Bloemfontein enters a pass on the skirts of the Wittebergen, known as Casteel Poort or Castel Pass, from the appearance of the rocks which overhang it. Our path now diverged to the right through a spur of the range, the country being here more hilly than any from the top of the Berg, and basaltic dykes absolutely netting the country in every direction. One hill, over the lower slope of which we passed, a very steep conical hill of sandstone, was divided by such a dyke into two equal portions. After crossing the country for a couple of miles, it ascended and divided another hill of less regular form in a similar manner. It is remarkable, notwithstanding the numerous traces of subterranean fire, that the sandstone strata, however rent, are nowise distorted, but preserve a perfect horizontality to the eye. Being detained here for a day and a half by rain, and dry cowdung being unprocurable, it was with the utmost difficulty that fuel enough, in the shape of a few small sticks, could be got together to make a fire. On the other hand, grass was plentiful and in great variety of beautiful species; the small Ethiopian lily with the purple spot (*Calla sp.?*), the Natal lily (*Amaryllis belladonna*), a dwarf erythrina with brilliant scarlet



spikes, and one species of indigo, and one or two of convolvulus and thistle, were also frequent. Yellow and crimson clover are also common among the grass.

After passing Dewald Hattling's farm at the foot of a ravine in this spur or range, we followed down a little stream, and reached successively Viljoen's and Dafel's farms; the latter situated on the edge of the Liebensberg Vley—a stream connecting a long series of marshy pools and marshes, and discharging itself eventually into Renoster River. Dafel's habitation was merely a hartebeest-house, or hurricane-hut, the posts or principal supports of which, from the scarcity of wood, consisted of the stems of grass or small reeds tied together. Before crossing the stream, which here flows rather rapidly, I fell in with an ostrich's nest, all the eggs of which, however, were gone or broken, and the slight depression in the loose sand, 3 to 4 feet in diameter, a good deal defaced. In a ruined stone kraal close by I startled a whole herd, some 20 or 30 wild pigs, which set off at full speed, with tails erect in air. These were the Vlak Vaark of the Dutch, and are of a leaden colour, with large protuberances under the eyes and enormous tusks.

Crossing the stream, we came once more upon the rolling plain, with a range of hills, however, to the right; the ground being thickly strewn with the bones and skulls of wildebeests (the black gnu), quaggas, and blesboks, herds of which, especially the gnus, now began for the first time to make their appearance. During our outspan here also (8th December) we heard for the first time the roar of the lion, which had previously alarmed our cattle and horses at the Eland River. The next morning we outspanned for breakfast near the Blaauw Kopje, or Blue Knoll, a mound of only some 40 or 50 feet in height, but from the flatness of the country conspicuous for many miles on every side. This country is known as the Hoog Veld, or Highlands. As we approached a series of stony precipices, the face of a plateau higher by some 60 or 80 feet, the herds of wildebeests, blesboks, and springboks became larger and larger. One of my drivers also killed a black snake, called the "ringhals" or "ringthroat," from two or three white bars under its throat: it measured about 4 feet in length, and is said to be very venomous. Within a fortnight I saw some seven or eight more of the ringhals, and three or four of a small brown kind called the "kousbaud" or garter-snake, but no other kind.

From this point I returned on horseback to Harrismith, following partly a different route. The path lay along the course of Liebenberg's Vley until I reached a farm or "place," called Pretorius's Kloof, at the commencement of the hilly country lying out from the Wittebergen, the flanks of which showed broad white patches or belts of quartz, probably from which they derive their

wheat in all this district had been a failure, partly owing to drought and partly to violent hailstorms.

*28th Dec.*—Towards evening trekked a few miles down the river to De Bruyn's, our eyes refreshed by a few scattered bushes, the first we had seen for a length of time. The banks of the river, from this place to its junction with the Vaal River, are sparingly fringed with small trees, chiefly white-thorn, mimosas, and willows. At Hemingse's learned that during twelve months they had killed here 21 lions. The plains, as usual, are intersected by little gullies connecting pools. At Alwerse's, two hours' trek, I left all my horses but two, the country before me having the reputation of being very unhealthy for them. Even here the low grounds only are deemed healthy; while it is said that on the high lands among the thorns they die in numbers. Usually the high grounds are considered most healthy.

*2nd January, 1852.*—Proceeded to Hans Smidt's, about two hours' trek, crossing one or two little wooded streams. Had a visit here from four Makati, or Mautatic Kafirs, one a lad of sixteen or eighteen, brother of the chief called by the Dutch "Zwartklip," from the place of his residence. I tried in vain to buy his clothing and amulets, but of another I purchased a sweatknife and some herbs used as charms against lions. When overtaken by night in the open "veld," these Kafirs chew a morsel of the drug, and, ejecting the spittle all around, lie down in the midst of the charmed circle. No lion dares invade it, and they sleep securely—in faith. One of my drivers found here an ostrich-nest containing twenty-five eggs.

*6th Jan.*—Proceeding over the flats towards the Vaal River—the hills around which were now full in view—the mirage filled the depressions in the plains with apparent lakes, on the borders of which the game, wildebeests, &c., stood with their quivering reflection beneath them.

*7th Jan.*—Outspanned in the evening by a vley or marsh, a few miles only from the ford of the Renoster River; this being the second day's trek without meeting with a house. These plains are considered to be much infested with lions, but we fortunately saw nothing of them. The following morning, leaving the waggons, I rode forward on horseback, seeing by the way a couple of ostriches and a fight between two wildebeest bulls. Crossing the Renoster River and skirting the hills, reached a farm, where the grass was so luxuriant as to overtop one's shoulder. Saw a graveyard, with inscriptions merely scratched or written on rough stones: pass successively Christian Borman's and his brother's and Janssen's; meet with four ostriches, and cross the Vaal by a long circuitous drift. The banks are well wooded and closely surrounded by rounded hills. At the drift the river widens out very much, being probably

a couple of hundred yards across.\* Reach Mooi River Dorp, or Potschefstroom (for that is the euphonious name under which the town labours), about 2 P.M. on the 9th, being about 4½ hours' ride from C. Borman's and 2¼ from crossing the Vaal. The Mooi River is about 15 yards across, but very deep, the town lying a couple of miles beyond the ford. In riding along this part of the road pools of water appeared on the path before me, retreating as I advanced, and reflecting the forms of cattle or horses which might be in the way. So near were they—about 100 yards—and so like water, that, had their receding not shown that it was only an illusion, I should not for a moment have doubted that they were the remains of a recent shower. Indeed, until thus disproved, I fully believed that they were so.

The village stands upon a plain almost as flat as a bowling-green, and from 6 to 10 miles in diameter, surrounded by hills. The soil is a red clayey sand, which seems to produce luxuriantly, though hailstones had unfortunately destroyed almost every appearance of fruit and barked the trees. The town is laid out on a large scale, with erven, or lots, of 100 yards square, and the water is brought out from three or four miles up the river. The supply, for some unexplained reason, does not appear to be over-abundant, as the inhabitants are supplied in turns for purposes of irrigation. There were, at the time of my visit, about 100 houses of one kind or another in the village, all of unburnt bricks and thatched. The appearance of the town is very pleasing.

The next day I spent at the village, and on that following returned to my waggons, which I found at Cronje's Farm. The next (12th January) a large number of Boers, all armed, arrived on their way to Sand River, to attend the meeting between Her Majesty's Commissioners and the Transvaal Boers on the 16th. The previous day I had overtaken a large number of waggons, and at Coqui's Drift passed through a camp of 15 or 20 more, with 50 or 100 Boers, all bound on the same errand. They talked very largely about demanding not merely the Sovereignty, but Natal, and they were evidently in a very excited and inflammable state.

Cronje's garden was one of the largest and best I had seen, containing a large vineyard, with apple-trees, tobacco, &c., and both wine and brandy are made on the farm. An hour's ride on horseback brought me to Pieterse's. Lions appeared to be still numerous in this neighbourhood: 7 having been killed at a hunt in one day about the New Year, and 57 altogether within two years. After 2¼ hours' drive we reached Van Vuuren's (or Fouré's

\* The regular width of the river I estimate, above its junction with the Mooi and Renoster rivers, at something over 100 yards, and at the drift from 200 to nearly 300.

farm), near the junction of the Renoster and Mooi rivers with the Vaal. The scenery here is very beautiful: the banks of the rivers are low, but well wooded with a variety of timber of considerable size, and several little islets, also wooded, add greatly to the beauty of the landscape. Bark is collected here from the mimosas for the purpose of tanning. The master, like most of the Boers, had gone to the Sand River Meeting, but several native children were pointed out to me on the farm as having been seized by the Boers on a recent commando, with a number of others, all of whom were distributed among the farmers for slaves. This practice, I was given to understand, was quite common, not merely among the Boers beyond the Vaal, but in the Sovereignty itself.

Having been detained by the swollen state of the river, it was the 16th January before we were able to cross; and we thus entered the country of the emigrant Boers on the very day that was to decide the question of peace or war between the Government and them. The drift was a very bad one, full of immense boulders and large holes, which rendered the passage both slow and unsafe. The journey to Mooi River Dorp occupied about 8 hours by waggon.

A day or two after, I had a ride in various directions around the town, and took one or two sketches. I had been previously warned to be cautious in doing so, as the Boers are very jealous of what they fear may be turned to their disadvantage. I met with some game, bucks, bustards (paauws and korhaans), &c. &c. In many parts the plains were covered with the nests of white ants, each furnished with a kind of chimney 2 to 3 feet in height and 6 to 9 inches in diameter, and, at the distance of even a yard or two, strongly resembling the trunk of a tree. Whether their purpose is to afford air or light I do not know; but, in looking down, the different passages or galleries may be seen leading off each side. The mirage was also frequently visible.

On the evening of Sunday, the 18th, some Boers came in with news of the result of the conference, which was celebrated the next day with great rejoicings, and Pretorius met with a triumphal reception. He delivered a short address in the open air, and was present in the evening at a dancing party at the landdrost's house, where he joined in a reel and country dance. I had some little conversation with him on the mode of government of the Boers, during the course of which he professed his anxiety to live on good terms with the English Government, and to give the Boers the blessings of a press. On Tuesday a meeting was held at the public offices, at which, after prayer and thanksgiving by Pretorius, lasting a quarter of an hour, he delivered a long address, exhorting to unanimity and a proper use of the blessings now secured them, and the treaty was read with a running commentary.

On the 21st, the following day, I proceeded on my journey, ascending after crossing the river, and on the 22nd reached Co's (Jacobus) Steen's, situated at what is called the Mooi River's Great Eye. One principal branch of the river here bursts out from under a rock, forming at once a stream 30 or 40 feet wide. I had here a specimen of native divination, performed by casting on the ground four pieces of bone, or horn, of several shapes. The implements, called altogether "daula," consist of the point of the hoof of a bullock, carved and named "murena" or "muremahula," the chief or the great chief; another, of the same description, called "sidjaro," the counsellor. Two others, flat pieces of bone or horn, carved into the rude resemblance of a human figure, represent respectively "mahali," the chief's wife, and "khazani," a counsellor (?). To these are sometimes added others, generally the kneecap of a baboon; and they are all pierced and strung to the edge of the mantle. If the inquiry is about the recovery of a sick person, the "daula" are thrown upon the ground; the patient being represented by the "murena:" if that stand upright, he will recover; if it fall on its side, "he is dead already,"—that is, as good as dead, he is sure to die, and so forth.

Half an hour's trek, passing the main road to the Magaliesberg, brought us to Lombard's farm, where we had a thunderstorm. Mine host told me a good deal about Origstadt, one of the most advanced posts of the Boers. The country, he says, is very unhealthy, and he had himself lost 1200 sheep, 14 horses, and 200 cattle. Fruit thrives, and the baobab, called by them the krematatboom, or cream-of-tartar tree, is abundant. The pulp in which the seeds are imbedded is white, of a slight subacid taste, and much used to make a drink. He spoke also of a magnetic mountain.

Here, on the Mooi river, tobacco thrives and pays well. For a load—about 100 rolls, of 10 lbs. each—Lombard got 16 cattle, 2 horses, and above 100 sheep, besides a considerable amount of cash. The following morning we crossed another branch of Mooi River, known as Turf Fontein, and reached Breidenbach's, one of the best cultivated places I had seen. In the garden he had quince, apricot, peach, walnut, and fig-trees, as well as vines. He grew tobacco also, 1200 lbs. of which he had that year sold at 9*d.* in goods and 6½*d.* cash: he had formerly got 1*s.* on the farm and 1*s.* 6*d.* at Bloemfontein. In one night Breidenbach had 16 cattle, mostly heifers in calf, killed by lions, of which 6 broke into the kraal.

An hour's trek brought us to Cronje's, where I saw, for the first time, a threshing-floor. The ground, a circle of 30 or 40 feet, is levelled, covered over with a coating of clay or anthracite, smeared, when dry, with cow-dung. The sheaves of grain being broken up

and spread out, oxen, to the number of 14 or more, are turned in and driven round. The straw is turned over with a fork, but, as I can testify from my own observation, no pains are taken to remove the droppings of the cattle. The operation occupies a couple of hours. When horses in sufficient number—4 to 10, or even more—can be had, they are preferred, as the process is thus both more effective and more speedy. The winnowing is simply performed by throwing up in the open air.

Had two or three wet days here. On the 26th of January crossed the river; here only 6 to 8 feet wide, flowing with a clear swift current between reedy banks. Crossing the shoulder of a rocky hill, had a view of an extensive plain, through which the river's course was marked by reeds. This plain had a soil of a rich black mould, and looked as if it had once been a lake. A few clumps of trees were scattered about the hill-sides. After about  $2\frac{3}{4}$  hours' trek, and having made the circuit of another "eye" of the river, reached Jan Esterhuys's farm, and outspanned. This eye was a reedy marsh. The ground in this neighbourhood was covered with the twin leaves of a beautiful creeping yellow cauhinia. I was here shown a number of manufactures from the Mooi River stone, as it is called,—a green soapstone, with considerable variety of markings. It is chiefly made into pipes, but also into basins, goblets, &c., &c. The following day went to visit the quarry, which merely consists of two or three holes in the ground, out of which the stone is got in irregular masses, into which it appears to split naturally. The largest pieces I saw were not more than a couple of feet in length, by eight or twelve inches wide, and generally tapering off to each end. Proceeding down a valley, at the head of which the quarry stands, we found the rock protruding abundantly in the form of silicious tables, rising a few inches only above the general surface, and supported often by but small portions of a softer material. Crossing a wider valley, we now proceeded through a very beautiful poort, or pass, to Christian Smidt's; passing by the way some fine groups of trees, in one of which was a nest, which I was told was that of a secretary-bird. It was fully 5 or 6 feet long, by 2 to 3 feet in diameter, and contained two apartments.

The following day (28th Jan.) I went to visit the "druppel kelder," or "dripping cellar"—a cavern situated in the poort we had passed through the day before. The entrance is by a kind of well about 20 feet wide and as many deep, situated in a clump of trees. A large stinkwood-tree grows in the mouth of the cave. On scrambling down, a passage on one side leads sloping to a distance of 60 or 80 yards, when you reach a wide chamber, from which several passages branch off. One leads a considerable way through high-arched chambers, supported in some places by pillars

of white limestone, to a low arch, through which you creep on hands and knees, and emerge eventually in a hall, 80 to 100 yards long, 25 wide, and as many high. From the end of this a passage leads in the same direction to a distance of 250 yards, and would, with the other, form one hall of that length, but for its narrowing somewhat, and the roof lowering to about 6 or 8 feet. A few stalactites of pure white limestone appear, and the same deposit in other places flows over the surface of the walls in sheets. In some places it is pierced so as to give an appearance of carved work, resembling Gothic tracery: although traces of Goths are more evident in the broken pillars, not a single one of which but has suffered from the hammer. In fact, these caves, which are numerous, are the lime-quarries of the country. In several places I found on the floor a kind of yellow ochre, and was told of a blue powder, which, however, I did not see. The floor of the outer chambers was covered deep with guano, the droppings chiefly of bats; although, from the bones lying about, I should judge the cave to be frequented also by beasts of prey.

A trek of  $1\frac{1}{2}$  hour brought me to Alwyn Botha's. Here the peaks of the Magaliesberg became first visible. A high wind blew all day—a somewhat rare occurrence here, I was informed. This part of the country is called the Hoogveld, or high country, and is deemed healthy for horses. The sickness is here, as in many other parts, attributed to the horses eating sweet grass while the dew is upon it; rain, even on the same grass, not having the same effect.

After passing Lochenberg's and Harmse's\* successively, we passed the remains of five or six extensive Kafir kraals, and from the brow of the Hoogveld had a magnificent view of the Magaliesberg, a vast range of three portions, between the peaks of which appeared the Schurft, or Debbelte Berg. The hill we were now descending, the last slope of the Witwater's Rand, was covered with white gravel, with black igneous rocks piercing through: the wood was chiefly mimosa. Between lay a broad valley, well wooded with mimosas and willows, &c., and with the mountain-range behind, greatly resembling the Carse of Stirling, backed by the Ochil hills. The evening (30th Jan.) beautifully clear after a breezy day, the third consecutively. Distant lightning in the east as usual every evening. Saw a firefly, the third only I have seen on this journey.

31st Jan.—Crossed the Selon's River (so named from a Kafir chief) and visited H. Rendsburg's and S. Krüger's. As seen from below, towards the east, the range presents a high unbroken ridge,† little varying in height, with a precipitous red cliff (quartz, I believe)

\* Harmse had 7000 vines in his vineyard.

† Six hundred or eight hundred feet, perhaps, above the plain; possibly much more, as I do not find any estimate among my notes.

at a considerable height, extending from end to end near its crest, and surmounted by another, similar, but not so high. The lower part of the mountain, *débris* apparently, is scooped out into gullies thickly wooded, the other parts of the slope being only sprinkled with trees. Towards the west, the range recedes peak after peak; one of those near the extremity being remarkable, at the distance of at least a dozen miles, for an immense white rock projecting, and apparently suspended, on the steep slope near the summit. Still more distinct, two peaks and another range—the Dwars Berg—rise faint above the horizon. The carse itself is strewn with stones in some places, and here and there a hillock, while the trees are many of them of considerable size. At Krüger's I found the garden to produce peaches, apricots, walnuts, pomegranates, figs, &c., as well as oranges and lemons. This district has the reputation of producing fine fruit in great quantity; but Krüger stated this reputation to be considerably overrated, as nearly all kinds are subject to a rust or blight, and those which escape this are destroyed by a kind of wasp. Grapes and figs he states to be less subject to these disasters than the other fruits. I enjoyed here a perfect bunch of grapes, but found the peaches bear out his words. He has lost a good many horses from the epidemic (a kind of pleuro-pneumonia, I believe), and, notwithstanding the outward beauty of his place, seemed rather desponding.

In a gorge here, I for the first time met with tree-ferns of considerable size, the stems 10 to 15 feet in height, crowned with their graceful drooping and waving fronds. At Vander Westhuys's I took a walk up the hillside, finding a coarse grit cropping out; but the upper part, at least the precipitous cliff, appeared quartzose, reddened by exposure and lichens. Many trees and insects I recognized as identical or nearly so with those of Natal, although not found in the intervening country, even where wooded. Among the trees I find wild medlars, cassonia and arduria, besides two species of mistletoe, both leafless, and different, therefore, from the Natal one.

For some days all about me had been prophesying rain: to-day (2nd Feb.) Vander Westhuys positively asserted it would not rain; but an hour after sunset a tremendous rain, preceded by a high wind, came on, and continued for nearly an hour. The next day, threading a narrow pass, we arrived, after  $2\frac{3}{4}$  hours' drive, at Stroo's farm at the back of the mountain, situated in a nook looking east over the plain, and so commanding the north side of the Magaliesberg range, which appears to spring suddenly out of the plain. Below on the plain, sprinkled over with sugarbush, mimosa, bockenhout, &c., were the few houses forming the village of Rustenburg; and beyond, a number of small isolated dark-coloured cones, running at right-angles to the range, and called the Zwarte Kopjes, or



Black Hills. Rustenburg (the Town of Rest), one of the three or four villages of the Transvaal Boers, consisted at the time of my visit of a church built of clay and some fifteen or twenty houses—half of them only in course of erection. The water is led out from the river, a small but beautifully clear stream.

Altogether I spent about a month in this region; but it would extend these memoranda to too great length to treat of it in detail. I found the neighbourhood pretty thickly populated by Boers, who seem to subsist chiefly by growing fruit, figs, and grapes especially, which are dried or converted into brandy. The price of this liquor, a very coarse fiery spirit, known in South Africa as “Cape smoke,” is 7*l.* or 7*l.* 10*s.* per halfaum: it is made from peaches as well as from the two fruits named. The figs are all pceled before drying, and are small and of inferior quality. The raisins are prepared by the aid of an alkali—the ash of a plant which grows only in the colony, and is used also for making soap: it is known as aschbosje, or ashbush, and is leafless; but I could not learn what it is. Tobacco is also grown to a considerable extent, sufficient at least by its sale to supply the Boers with what luxuries they want. Wheat and a little barley are grown almost solely for their own consumption. The soil is generally poor, and but little pains are taken in manuring. The usual way of effecting this is to form a cattle-kraal on the spot intended to be cultivated, shifting it from time to time till the whole has had a sprinkling of dung. The giving the cattle grass or straw for bedding is never thought of, and the manure deposited in this way is left exposed to sun and elements. Skins are also tanned for sale in the colony, and find a ready sale, although the process is but imperfectly practised. The kinds usually tanned are hartebeest, blesbok, camelopard, &c. Shamboks and oxriems are also made for sale to a small extent. But by far the most important article of export is ivory, chiefly brought from the more remote parts of the district, the Marikwa, Zoutpansberg, and the great lake Ngami: it is chiefly disposed of to traders, although some of the hunters prefer conveying it to the Cape and Natal themselves. The trade with Delagoa Bay is very trifling; and I suspect, from the horror with which that place is regarded on account of the fever, its traffic even with the nearer parts of the Transvaal country, as Zoutpansberg, &c., is on the decrease. One chief inducement to deal with the Portuguese is the facility of obtaining gunpowder.

Sheep will live in but few places north of the Vaal, and the produce of wool is, therefore, very trifling; nor is that of butter great, although it might be made so. The salt employed in curing it is almost entirely the produce of salt pans, which are abundant in some parts of the country, and indeed give its name to the Zoutpansberg: it is of a reddish colour and sweetish, containing, I suspect,

but a small portion of muriate of soda and a large proportion of magnesia. Cattle from the south of the Vaal and horses do not thrive, or at least are subject to epidemics. I should suppose the climate unhealthy also for human beings, from the accounts I heard of the prevalence of disease; but the want of cleanliness and airiness about the persons and houses of the people, the practice of sleeping in their day-clothes, common to both sexes, and on an earthen floor, often with only a mat underneath, and frequently the whole family in one apartment, ventilated only by the door and a "hole"—all this must greatly aggravate any natural unhealthiness of the climate. There is also a total absence of qualified medical practitioners. A new disorder had been very fatal lately: it was known as the "keelpok," or "throatpox," and from description I should think was a kind of ulcerated or putrid sore throat. During my visit to the Magaliesberg, and as I was leaving, I heard a great deal of a very fatal fever prevalent on the Marikwa River to the westward.

There were, at the time I speak of, no clergymen resident in the Transvaal country, and it was but rarely visited by a clergyman from the Sovereignty, or the old colony.\* There were a good many so-called schoolmasters, consisting chiefly of deserters from the English service—men for the most part but little versed in their own tongue, and certainly knowing still less of Dutch. They itinerate from farm to farm, hoarding first at one and then at another. The fee for each child, one of them told me, was 3 dollars (4s. 6d.) per month, and they have sometimes as many as a dozen pupils at once. Much, however, as the parents profess to value education, they are generally satisfied if the children can spell their way through a chapter of the Bible or the Catechism, and their attainments in writing and arithmetic are about on a par with those in reading. I could adduce instances of official persons who might reasonably have been expected to spell and write grammatically, but could do neither, and indeed appeared to "hold it a baseness to write fair."

Owing to the distance often from house to house, and the rapid decomposition of dead bodies, the practice of keeping a ready-made coffin on every farm is general; and you may hear a mistress bid her servant fetch this or that, "she will find it in the coffin."

While in the Magaliesberg I visited Mahata, a native chief of a small tribe called the Bapugeni. His chief town, where I found him, consisted probably of some 300 huts, and besides it he commands some 20 or 22 others.

A number of these lie along the foot of a spur of the Magaliesberg running northward, and the remainder are situated at some

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\* One or two clergymen have since arrived from Holland, and settled there.

distance. I could learn nothing positive as to the number of Mahata's people, but the greater part of the towns I understood to be smaller than that where he has his principal residence. Every hut or house is divided from the others by a fence or wall, and is surrounded by a broad eave or veranda. The hut itself is circular, built of stone plastered over with clay, and in the better class polished inside and out with beeswax. The roof is thatched with straw or reeds, conical, and 20 or 30 feet in height. The courtyards surrounding the huts are plastered, and kept scrupulously clean. The front half of the veranda is usually enclosed with a dwarf wall, and the semicircular doorway, 18 or 20 inches in height, closed by a board sliding behind a couple of pilasters forming a frame. Opposite the door inside, and extending a third of the way round, is a platform or dais raised about 6 inches, in which are sometimes planted the stems of one or two small trees, the branches of which serve to hang articles upon. The inside of the hut is in the middle, about 6 feet high, oval in section, and without light or ventilation, except from the doorway. The towns appear to be a series of circles originally surrounding the cattle-kraals, and added to as occasion requires. There does not seem to be any regularity of plan, but streets lead from one part to another, sometimes 30 or 40 yards in width. In Pugení, the chief town, there are several cattle-kraals: the principal one, a well-built oval, 93 yards in diameter between its axes. The wall is of dry stones, fully 4 feet in thickness, of equal height, and as well built as if the work of a European mason. Altogether, the cleanliness pervading these native kraals is such as ought to shame the Dutch Boers.

Mahata has sixteen wives, of whom I saw one, Zit, as well as several of their children, and sketched them; Mahata at first objecting, but afterwards much pleased, and pointing out and explaining everything to those around. He succeeded his father as chief eighteen years previously, and appears to be affable and very popular with his people.

The dress of the men consists of a triangular piece of leather, two ends fastened round the loins, and the third passed between the legs and fastened behind. Besides this, they wear a mantle made of dressed skins, and frequently a hat or helmet of various shapes made of the same material. Sandals are also very commonly worn. The women's dress consists of a short leather petticoat, over which they also frequently wear a mantle. The young children of both sexes go naked, or wear only a string or two of beads. I observed nothing peculiar in the mode of the men's dressing their hair. In the case of some young boys and girls they had a line about an inch in breadth shaved from front to back, and another from ear to ear, forming a cross on the top of the head. This was said to be

produced by pricking or scratching the head with a needle for the purpose of curing some illness, which it probably relieves by loss of blood. The women's heads are shaved all round, leaving a large circular patch in the middle. I observed at Mahata's a man belonging to the tribe of a neighbouring chief, Tshan, and whose head was all shaved, except a long oval patch on the crown like a clown's cockscomb. In dress this tribe resembles Mahata's, except that they colour the girdle or mahazana red with clay or ochre. Many of these natives I observed marked with the smallpox, a disease not now prevalent among them, as Mahata told me, but formerly both common and fatal. Like all the tribes I traversed, they are usually called by the Dutch "*Makalis*," and are a branch of the great Bechuana family.

The whole Magaliesberg, so far as I explored it, appears to be a range in some places double, rising abruptly out of a plain, and running for at least 30 miles in the general direction of east and west. Several rivers rise on the south side—one, the *Selon's River*, already named, running westward to the western extremity of the range, where it bends north-east, and eventually, I believe, flows into the *Limpopo*. Eastward of the sources of the *Selon's River* rises the *Hex River*, which, after a westerly course of some miles, passes through a very narrow cleft to the north side of the range, and flows nearly north. Still farther to the east, between two parallel branches of the range, rises the *Sterk Spruit*, which in the same way passes through a narrow gorge and flows northward. The rivers to the east I only know by report: two of the chief are the *Krokodyl* and the *Olifant* rivers; and all, like those I have before named, after a northerly course, join the *Limpopo*, I believe, and are discharged into *Delagoa Bay*. To the westward of the *Magaliesberg* is the range called the *Dwars Berg* (the '*Thwart* or '*Cross Mountains*'), running north-east, between the *Selon's* and the *Marikwa* rivers, I believe. The *Schurfte*, *Dubbelte*, or *Pillan's Berg* (perhaps a part of the same range), also lies to the north-west, and was said to have been lately entirely depopulated by some fatal epidemic among the natives. The first name is owing to its rugged form; the second to its bending round upon itself, forming a central valley; and the last it derives from a native chief named *Pillan* inhabiting it. To the north, distant some dozen miles or more, were visible the *Vliege* or *Fly Mountains*, a range infested by the *tsetse* or poisonous fly, said to be every year more nearly approaching the inhabited country.

The *Magaliesberg* itself, especially on the north side, is intersected by numerous ravines, many of which I explored to a considerable distance. These varied in width from 8 or 10 feet to 100 or 200 yards, with perpendicular sides often a couple of hundred feet high. The scenery was magnificent in the extreme, the

wider ravines being filled with large timber in great variety, and the narrower chasms with tree-ferns, while the walls were draped with curtains of delicate ferns, such as *gleichenia*, trailing their slender fronds, a dozen or twenty feet long, over the mouth of some dark recess; while, high up, aloes, euphorbias, and other succulent plants in great variety filled every crevice.

Crossing the range at the Olifant's Neck or Elephant Pass, close by the gorge through which the Heks or Witch River passes, I skirted the range for a few miles on the south side, and, crossing the valley, ascended once more the gentle slope of the Witwater's Rand by a road as black as that leading to a coal-mine, reaching at length a plain where the red sandy soil reappeared. Many bare patches entirely destitute of vegetation occur, particularly on this soil. One or two looked as if a waterspout had burst over them, carrying away every blade of grass; but they could not, I think, all arise from such a cause. Large numbers of guinea-fowl were roosting upon the trees. It is not a little singular that, during the five weeks I spent on the north side of the Magaliesberg, I had not once seen or heard the lesser bustard, known as the *korhaan*; but as I was descending the southern slope, its well-known cry struck my ear, and I again found it abundant. The elevation and climate are as nearly identical as possible, and the passage from one side to the other perfectly easy; and yet I believe my observation was borne out by the accounts of residents.

As I advanced, the trees became more and more rare, and at last quite disappeared; and I found myself once more on the bare rolling plains of the Witwater's Rand. On the third evening arrived at Hol Fontein or Hollow Fountain (one of several similar streams occurring in this region), which springs forth among reeds, and, after a swift strong course of a few hundred yards, again disappears amidst a bed of reeds and rushes. The stream is sufficiently powerful to supply two courses for irrigation without exhausting the main current.

At this place I saw the only specimen of the waterbuck met with on my journey: she came close to the waggon, and crossed and recrossed the stream several times with a motion the easiest and most graceful possible, followed all the time by our whole troop of dogs, and was captured at last from her feet passing through the thatch of a hut, the roof of which she climbed in her attempt to escape. She was a young doe, and destitute of horns.

Proceeding on our journey, we found the country to have quite changed its aspect, and to consist of long plains or swelling downs, the horizon undulating, the soil pierced by masses of flint, and sharp jagged rocks exhibiting the burnt "scowthered" appearance of slag and cinders. Trees are not to be met with for miles, and then only on some slope at a distance. The few visible are of a

scrubby mimosa kind. A drive of 4 or 4½ hours brought us to Wonder Fontein. Before us lay the ridge of the Gatsch Rand, of no great height, but conspicuous above the general level. The Wonder Fountain, like the Hollow Fountain, rises in a marsh; and, after flowing something more than a mile, sinks, as the people aver, in two places. To one of these I was led: from description I expected to find a cleft into which the water precipitated itself, but found instead a rocky precipice overhanging an extensive marsh to a height of 20 or 30 feet. In one place only could I detect any motion in the water, which I imagine finds its way under the rock, and filters down through imperceptible crevices. Similar precipices overhung the marsh in several places, and trees and bushes of various kinds, stinkwood, large olive-trees, wait-a-bits, toughwood, and mimosas, were scattered around; clumps of them showing their tops out of and clustering round deep holes, similar to the entrance of the Druppel Kelder in the Witwater's Rand. These caverns are very numerous in this quarter; indeed, the ranges of the Witwater and Gatsche Rand, with the valley between, are filled with them. Piet. Geldenhuys, a Boer in an adjoining farm, was, when a boy, lowered, as I was told, into one of these holes to a depth of 60 feet without reaching the bottom, although he heard the sound of water below him. There can be little doubt that the streams lost, like this wondrous fountain, on these higher grounds, are the same that reappear lower down as the various "eyes" of the Mooi River. At the point where I crossed this stream it formed two branches,—the larger, a square channel, 6 feet wide and 2 deep, as I ascertained by measurement; the other considerably smaller: but the current in both was rapid, I should think at least 4 miles an hour.

Leaving Wonder Fontein, and ascending the Gatsche Rand, or Cavern Range, and passing through a rocky, wooded defile, after three hours' trek reached the farm of Philip Schuit. The whole slope, after emerging from the pass, was covered with the sugar-bush, which we had not seen since leaving the Magaliesberg. Schuit appeared a very favourable specimen of his class, and his "place," house, and garden superior to the most. His grapes this year had been destroyed by hoar-frosts, but his crop of peaches was so large that he was unable to master them, although he had dried 7 or 8 muids,\* besides what were consumed fresh. He had sold nearly all he had dried at 3s. per emmer, or 2½s. per muid. Schuit was one of a class, to my surprise, pretty numerous among the Boers; he drank no brandy, although he distilled largely, and gave me a sample made from peaches.

In the neighbourhood was a cave running several hundred yards

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\* A muid, equal to three bushels.

underground, and then re-emerging in the light of day ; but I could not spare the time necessary to visit it. It is inhabited by immense herds of baboons. I ought to have mentioned that, when in the Magaliesberg, I heard of the existence there of the ourang-outang, or some similar large ape.

At Schuit's place, 27 horses had already died this year : indeed it proved a very fatal year to that kind of stock throughout the whole of South-Africa.

From Schuit's I proceeded to Deel Kraal, Geldenhuys's ; and thence, after about seven hours' trek, on the 15th March, once more reached the village of Mooi, river Doorp, at Potschefstroom, the etymology of the name of which I could not learn, although two or three attempts were made to explain it. The "*pot*," it was generally allowed, referred to Hendrick Potgieter, one of the leaders of the Boers in their exodus, but the "*schef*" no one could satisfactorily account for.

A great part of the country I had passed through during the last six weeks or two months, and especially the southern side of the Magaliesberg, was covered with ruined kraals, the remains of tribes of natives driven out or extirpated by Moselakatse, in his devastating progress from Zululand to his eventual settlement to the north-west.

Since leaving the Magaliesberg the nights had been cold, and till the equinox high winds frequent, and on the 21st and 22nd dense Scotch mist and rain. We had now reached the Renoster River, and entered on the long, houseless, treeless flats, abounding in game, and, although cool, frequently displaying the mirage ; the hollows seeming as if filled with water, and the distant hills rising like islands from a shimmering sea. The wind blew fresh, and tall columns of dust in the distance showed the contention of different currents of air.

I must note here, what appears to be characteristic of dogs in this part of the world—the ease with which they attach themselves to a new owner. I have repeatedly seen a dog taken from a "place," tied to a waggon, and within an hour, when untied, he would run with the other dogs, as if he had never known any other mode of life, or had another master. I am at a loss to account for this, except by the Boers themselves showing but little attention or regard for their dogs, which, therefore, easily forget them when more noticed and petted. While outspanned once more, on 24th March, at Alwerse's place, the largest flight of locusts I ever saw passed. The rushing of their wings was like the noise of a great waterfall at a distance ; and those who have never seen a flight of them can have no comparison more apt than a fall of snow : their very motion—twinkling in the air—resembles that of snow ; and, except for their colour, whether at a distance or tolerably

near at hand, one might almost take them for a snow-shower. At Alwerse's not a single horse had died out of a hundred, excepting one or two known or believed to have had the disease when brought there, as they are from all quarters around during the sickly season.

A short cut took us, after a couple of hours' trek, to Christian Smidt's, and the following day (25th March), crossing the Renoster River, we took a new road on our return to Harrismith, by way of the Vechtkop, a hill so called (Fighthill) from a battle fought here in 1835 between the Boers and Moselakatse's army; the latter, it is said, being nearly exterminated. Numerous skulls still lie about, I was told, but too late to look for them. The Vechtkop bears about s.e. by e. from Smidt's, and a spitskop, or conical hill, about e. by s. from the same place, from which our outspan was distant about  $2\frac{1}{2}$  hours by waggon, s.e.  $\frac{1}{2}$  e. The hills on the right were covered with the ruins of extensive Kafir kraals, probably those of tribes driven out by Moselakatse. Our outspan for the night was an hour's trek farther on, due s. of the Vechtkop, which here appeared only one of many precipitous outskirts of a treeless, bushless table-land. Lions are numerous, but were only heard once during the night. Proceeding for some hours along a ridge forming a watershed, and generally in a southerly direction, we passed through large herds of wildebeests (gnus) and quaggas, which disappeared, however, towards the end of our march, when we fell in with a troop of six ostriches. In the twilight we repeatedly heard the lion at a distance.

Next day we reached the brow of a series of high lands, which we had been traversing, and began our descent into the lower ground; passing numerous round or oval hollows called "pans," alternately lakes and dry ground, with perhaps a rushy spot in the middle, and frequented by herds of wild swine, the vlak-vaark of the Dutch Boers. Game was again plentiful for a time—quaggas, blesboks, black wildebeests, and, for the first time, a few blue wildebeests or brindled gnu.

Crossing Liebenberg's Vley Spruit, considerably lower than before, we passed close by a conical peak—a conspicuous landmark—and turning, amid several other rocky hills, to the southward once more, we outspanned, after eight hours' trek, near some pools, and were regaled during nearly the whole night by the laughing neigh of the quagga, the grunting, yelping bark of the gnu, the shrill cry of the jackal, and the dismal howl of the hyena or wolf, as it is usually called.

Emerging from the hollow where we had spent the night, we came clearly in view of the hills behind D. Hatting's, and by and by got a glimpse of Plattberg, as well as of several other hills, which for some days past had been our landmarks—isolated frag-



ments, for the most part, of a sandstone plateau, still horizontal in its stratification, although the mighty workings of nature have carried away everything except here a triangle, there a square, here again a narrow stripe like a wall. Winding along among the hills, seeing now a few ostriches and now a herd of hartebeests in the distance, we emerged at length in the valley, through which runs the main road between Harrismith and Winburg; and, after an eight or nine hours' trek, outspanned once more at the Sand Spruit, which we found so dry as hardly to afford a drop of water for our own use, and none whatever for the cattle.

The following morning we started by sunrise, and outspanned at Eland River to breakfast. Starting once more, and passing a remarkable hill with a wall-like crown, which divides the Harrismith road and the old road to Natal, we were overtaken by a storm of hail and rain, which forced us to outspan for the night in a situation without fuel and without water. Next day, Tuesday, the 20th March, we once more reached Harrismith; and here I may terminate these very imperfect memoranda. With the exception of a compass, by means of which I took roughly the bearings of different points on my return between Renoster River and Harrismith, I had no instruments whatever for making observations. Even distances traversed, whether by waggon or on horseback, I could only compute by the time occupied; and this, for a length of time, without the use of a watch. All, therefore, that my memoranda, and the sketch-map of my route, profess to do, is to give such general impressions as would be made by the external aspect of the country on an ordinary traveller in circumstances so unfavourable to correct observation.

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XXI.—*Account of Ghadamis.* By C. H. DICKSON, Esq., F.R.G.S.,  
H.B.M. Consul at Sukum Kalé.

*Read, June 27, 1859.*

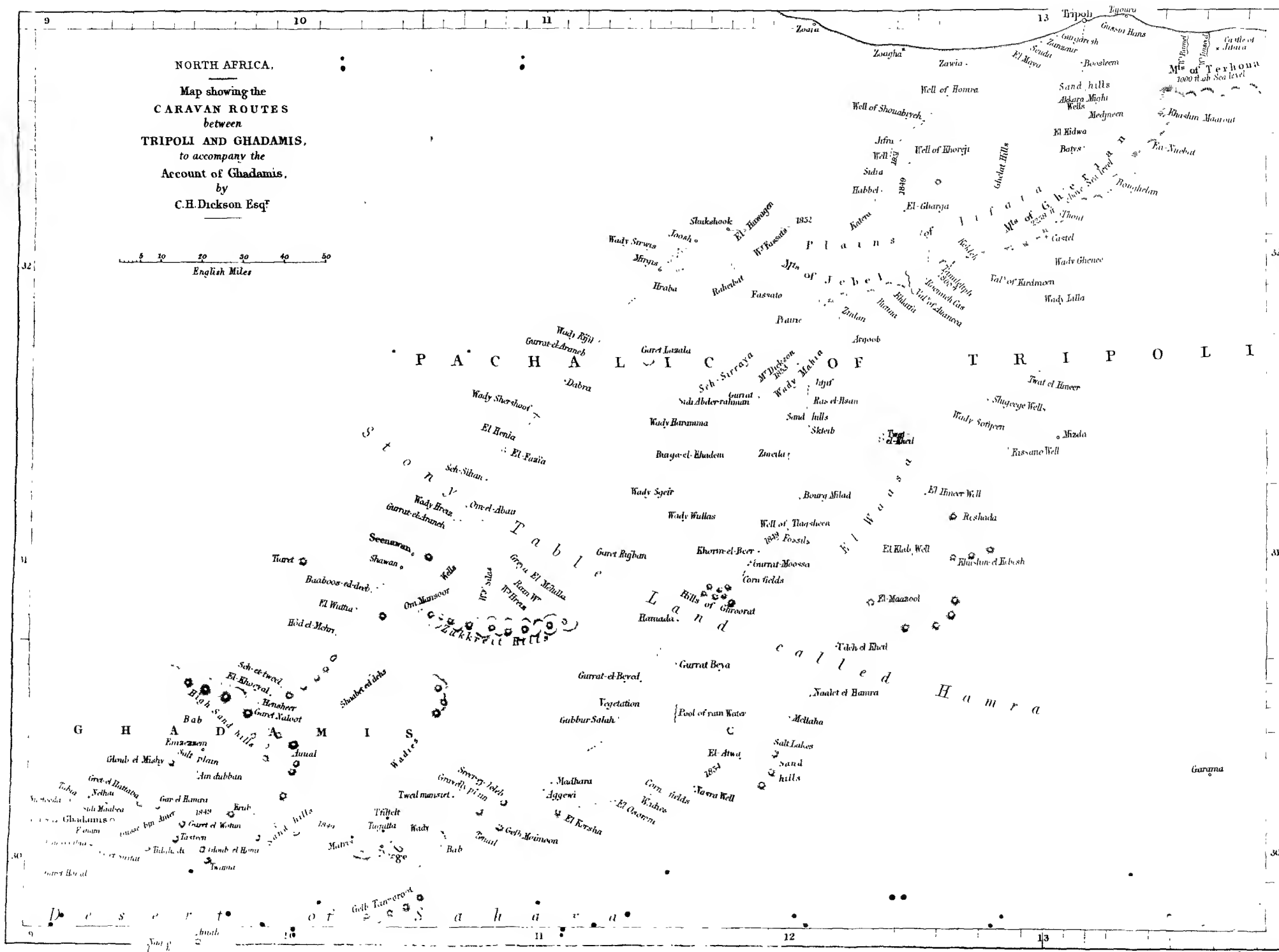
THE district of Ghadamis is situated on the northern boundary of the Desert of Sahara, and forms the south-western frontier of the pashalic of Tripoli. It comprises three oases, namely, Ghadamis Proper, Derge, and Seenawan. Derge, which is distant some 50 miles from Ghadamis, consists of the villages of Derge Proper, Tugulla, Matris, and Tfilfelt. Seenawan consists of the villages of Seenawan Proper and Shawan, distant about 80 miles from Ghadamis. • The oases of Ghadamis, Derge, and Seenawan have an average circumference of 6, 10, and 4 miles respectively. Ghadamis and Seenawan are almost equidistant from Derge, the whole district forming an isosceles triangle, the area of which may be estimated at 1200 square miles. Beyond these cultivated spots

the surface is purely desert, the geological structure consisting principally of horizontal strata of sandstone and limestone, intersected by small dry valleys; also of ridges and sand-hills. There is no basalt, nor any plutonic formation. The black stones with which the Sahara is strewn are flints and sandstone blackened by the influence of the atmosphere, owing to the presence of a little iron.

Besides being known as the Cydamus of the ancient Romans, Ghadamis, according to the most authentic accounts in possession of the natives, existed in the seventh century, when the first mosque was erected. In this mosque are deposited the remains of Sidi Okba-el-Beddri, successor to the celebrated warrior of that name, and with whose invasion of Northern Africa this epoch corresponds. It is not, improbable, however, that Ghadamis may have existed in the time of the Carthaginians, and that it became a Libyo-Phœnician colony. In support of this hypothesis I may advert to the Berber origin of the natives and their language, the subjection of the oases to the Government of Tunis at a remote period, while the extensive land trade of the Phœnicians must have rendered the acquisition of Ghadamis by them indispensable. Ghadamis has, nevertheless, as well as more celebrated cities, the tales of its origin; yet, whatever this may be, there can be no doubt that its existence is owing to a large spring which serves to irrigate the whole oasis. According to popular tradition the discovery of this spring, and consequently the origin of Ghadamis, is ascribed to a mare. It is said that a party of Arabs while wandering about the Sahara once missed a bowl out of which they had been eating. One of the party having been despatched in quest of it, retraced his steps to the spot where they had dined the previous day, and on which Ghadamis now stands (then a mere parched waste). The Arab had no sooner arrived and found the missing bowl, than his thirsty charger, a mare, impelled by instinct, began scratching strenuously the ground with its hoofs, and behold, a limpid stream gushed out! The successful bowl-seeker, and still more fortunate discoverer of the precious element, on his return to his companions, being interrogated as to the spot where he discovered the bowl and water, replied, "*Ghadà àmis*," literally, "Dinner yesterday." Hence the name of the place. On the other hand, the natives presume that after the discovery of the spring by the mare, the foundations of a wall forming a basin were found a few feet below the surface; consequently the spring must have existed at a more remote period, and may have been choked up with sand. The water in question is hot, having a temperature of 89° Fahr. It is used for all domestic purposes, and allowed to cool for twenty-four hours in jars and goat skins prepared for the purpose, previous to being drunk. It has a flat taste, and produces a



A horizontal scale bar labeled "English Miles" with markings at 5, 10, 20, 30, 40, and 50.



laxative effect on strangers. Although perfectly transparent, the water must be very impure, and on being analysed deposited a considerable sediment, probably of carbonate of lime and organic remains. Treated with the following re-agents it gave,

With caustic ammonia, a considerable white precipitate :

With oxalic acid, a considerable white precipitate :

With nitrate of baryta, a considerable white precipitate :

With phosphate of soda and ammonia, also a considerable white precipitate :

With nitrate of silver, a less considerable white precipitate.

The water, therefore, contains probably the sulphates of lime, magnesia, and alum, and the muriate of soda.

The aggregate amount of the population of the whole district of Ghadamis is computed at 6500, of which number Ghadamis Proper contains 4000, Derge 2000, and Seenawan 500, all Mohammedans. The natives are divided into four classes:—the Harar, or freemen, the Homran, the Attara, and the Slaves. The Harar claim their descent from the original male landed proprietors of the country, who were of pure blood. The Homran trace their origin to Arab settlers (male), who, although of free blood, married at the time slaves being the property of natives; hence their designation, which means *coloured*. The Attara are the offspring of manumitted male slaves. One of the peculiarities of this last caste, according to the ancient customs of the country, is that it is incapacitated from giving testimony in a court of law. These classes bear the following proportions taken upon 20:—Harar, 12; Attara, 5; Slaves, 2; Homrance, 1. The proportion of females to that of males is 3 to 1.

The district of Ghadamis is governed by a Moudir Bey placed under the jurisdiction of the Governor of the Jebel mountains. The Moudir is assisted in his administration by a Kadi, or judge, and his Mufti, a Sheikh, or Deputy-Governor, and a Municipal Council.

Ghadamis contains six mosques and seven schools, at which latter the children of the poor and wealthy are taught indiscriminately; the former being exempt from payment. Education is at a very low ebb, the sum total of learning being the Koran, which the children are taught by rote, and a little Arabic writing. The natives in general are good linguists, being conversant with the Arabic, Haussa, and Tuaric languages, in addition to their own dialect, which is the Berber. Some also speak the Timbuctoo and Bornou languages. The women also boast of a superior education to that of their sex in general, being able to read and write a little, in addition to other domestic avocations. The natives reckon themselves Marabouts, or saints; yet, in former times, they were

divided into two factions—the Beni-Wazeet and Beni-Ouleed—and continually retaliated upon each other their feuds. Even at this day each party occupies a separate quarter, and has little intercourse with the other. Such is the reverence for the Prophet and the excellence of his name at Ghadamis, that three-fourths of the natives are called *Mohammed*; and I know six brothers who are called after that name, being designated as the senior, junior, second, third, &c., Mohammed.

The population of Ghadamis Proper is essentially commercial; those of Derge and Seenawan are devoted to agriculture. Owing to the constant drought, the oasis of Ghadamis is entirely dependant upon the Jebel mountains, Derge, and Seenawan for its supplies. The gardens grow dates (of a superior quality), barley, wheat, and millet, besides melons, onions, &c., but the quantity produced is inadequate to the requirements of the population. The different kinds of seed are sown in the following rotation—wheat and barley in October, and are reaped in April; next follow millet and lucerne, and vegetables, which last till autumn. The soil seldom remains fallow, but is manured regularly in October. The manure is procured from the city sewers. The corn of the Sahara is superior to that raised on the coast, being more farinaceous. The average yield of a date-tree at Ghadamis is one camel-load (4 cwts.). The water with which the gardens are irrigated is supplied from the central hot-spring by means of three ducts. The quantity is measured out on the principle of an hour-glass—thus a small bucket, called a *kadoos*, is attached to a small aperture in the wall forming the basin of the spring, through which the water drops into the bucket; and this takes 42 minutes in being filled. A man watches the bucket day and night, and marks each time it is filled, the water meanwhile flowing through the ducts into the gardens. The whole quantity of this water is valued at one quarter of a million of mahboobs (40,000*l.*), and portions of it are bought, sold, and inherited like any other property. There are, in addition to the hot-spring, a few wells of fresh water, but, being brackish, it is not used.

The fall of rain is very precarious, occurring about once every four years. Such, however, are the fertilising properties of the soil in the neighbourhood of Ghadamis, that one copious shower in autumn is sufficient to ensure a crop of corn, which yields an average of twenty fold; while, on the other hand, a rich pasture is to be found. Truffles of an enormous size, some weighing 6 lbs., are also produced, particularly when the autumnal rain is accompanied with hail. The truffle is cut into shreds, dried in the sun, and thus preserves for a twelvemonth. The juice of the fresh truffle is also deemed by the natives a sovereign remedy for ophthalmia. Snow has sometimes, yet rarely, been seen in [this

part of the Sahara. In January, 1821, a fall occurred, and proved fatal to a slave-caravan coming to Ghadamis from Ghat, the snow having lain a whole night on the ground, about half a foot deep.

The climate of Ghadamis is dry and healthy, but oppressively hot in summer. There is no prevailing disease, nor have plague and cholera ever been known: a remarkable circumstance, that the plague, which is known to have raged ten different times on the coast during the last two centuries, never extended to the interior beyond Sockna, Mizda, and the Jebel mountains.

By a meteorological table kept during four successive years, beginning from 1850, the thermometer has an annual range of about  $74^{\circ}$ , falling in January to  $35^{\circ}$ , and rising in July to  $109^{\circ}$  (Fahrenheit). The prevailing winds are the easterly and south-westerly; and during the equinoxes, especially the autumnal, the latter wind blows with uncommon violence, filling the atmosphere with almost impalpable particles of sand.

The revenue of Ghadamis is estimated at 10,000 mahboobs (1700*l.*), and is derived from the following sources:—

1°. The annual tribute, amounting to 6150 mahboobs, levied partly upon real property and partly upon the personal property of every merchant, according to a conjectural valuation.

2°. The custom-dues, consisting of 9 per cent. import, and 3 per cent. export duty.

3°. A toll of 10 paras ( $\frac{1}{2}$ *d.*) on every camel-load of merchandise arising at Ghadamis.

4°. A tax of 5 per cent. upon the proceeds of every camel sold in the place.

The two last taxes are appropriated by the local Governor.

There are a few native manufactures, but all of a very inferior kind. These are woollen blankets, bernousses, shoes, &c.

The commerce of Ghadamis is carried on principally with Ghat, Kano, Timbuctoo, Tuat, and other parts of the interior of Africa, and with Tripoli. The exports from the interior consist of ivory, bees-wax, bullock-hides, goat-skins dyed red and yellow, ostrich-feathers, gold in lumps and dust, goroo-beans, gum-bekhoor used as incense, cotton shirts, &c. On the other hand, caravans convey from Tripoli to the interior cotton cloths and long cloths, Tangibs, all of British manufacture; red-dyed raw silk, beads, from Venice; woollen cloths, red caps, from Tunis; paper, sugar, zinc, copper, sword-blades, mirrors, and small needles, from Germany; gum benzoin, cloves, otto of roses, &c.

The burden of a camel is usually  $3\frac{1}{2}$  cantars (4 cwt.). The current medium of exchange of Ghadamis is the Tunisian piastre, equal to 6*d.* sterling.

Gold is sold by the mitkhal; equal to 69 grains (troy weight).

About 12,000 mithkals are annually imported to Ghadamis, valued at 6000*l*.

The following is the average rate of carriage per load in Tunisian piastres, and the average duration of the march of caravans, exclusive of stoppages, from Ghadamis to

	Piastres.	Days.
The Jebel Mountains .. ..	14	7
Tripoli .. ..	22	12
Ghat .. ..	30	20
Kano .. ..	250	110
Tuat .. ..	63	22
Timbuctoo .. ..	300	60
Souf .. ..	28	18

The caravans from Souf carry dates and woollen blankets, both of a superior quality.

In connexion with the commerce of Ghadamis, I must not omit mentioning the slave-trade, which was there actively carried on in former years. During my residence at Ghadamis the average number imported during the year was 500, principally females. The average price of a male was 60 mahboobs (10*l*.); that of a female 80 mahboobs (14*l*.) Of the number exported to the Levant two-thirds generally perished from pulmonary affections, caused no doubt by the hardships of desert travelling, as well as by the change of climate.

I am happy to state, in conclusion, that a decree from his Imperial Majesty Sultan Abd-ul-Mejid abolishes for ever this nefarious traffic. The new law was promulgated in the pashalic of Tripoli in 1856, and although it met with considerable opposition from the natives at first, it is now, I believe, faithfully observed.

XXII.—*Notes to accompany the Map of St. Helena.*—By Major EDMUND PALMER, R.A., F.R.G.S.

*Read, June 27, 1859.*

THE map of St. Helena, now before the Fellows of the Royal Geographical Society, was executed during a residence of nearly six years on that island. It is shortly to be published on the reduced scale of  $\frac{1}{27,000}$  by the Topographical Department of the War Office; and the author trusts that it may be instrumental in throwing some light upon the geology of one of the most interesting spots in the Atlantic.

The island of St Helena, so well known to many a homeward-bound voyager, is situated in lat. 15° 56' s., long. 5° 45' w., at a distance of 1000 miles from the African coast, and 1700 from the coast of South America: it is of an oblong form, lying from



south-west to north-east, being 12 miles in length and 7 in breadth, with an area of about 50 square miles, or nearly one-third the size of the Isle of Wight.

The island is said to have been discovered by Juan de Nova Castella, a Portuguese navigator, on the festival of St. Helena, A.D. 1502, 3rd May; but it appears, on reference to a collection of voyages by Battisto Ramusius, that an island answering to the description of St. Helena was discovered in July, 1503, by a Portuguese ship returning from India, and the circumstance chronicled by Thomas Lopez, the captain's secretary, who states that, after passing the Cape of Good Hope, they ran down the trade wind for 12 days, and sailing 600 leagues saw an island, thickly wooded with a low vegetation, but without large trees.

However this may be, the Portuguese being once aware of the position of the island, and perceiving the great advantages to be derived from it as a place of refreshment for their weather-beaten ships and sickly crews, established a small settlement in James Valley, and, in 1571, a chapel was built and two friars appointed to perform the religious duties and to look after the resources of the place, the materials of the chapel being furnished from the timbers of the wreck of a Portuguese caravel. Tradition asserts that the island was also inhabited about this time by a disgraced nobleman, named Fernan Lopez.

*Purchas's Pilgrims.*—The next mention of the island is in the voyage of one Lopez, who put in there on his voyage to Congo in 1588, in the good ship *St. Anthony*; a marginal reference informing us that the place was covered with "Eben wood." The same year, however, the distinguished navigator Cavendish sighted the island, and being the first Englishman who landed on its shores, some extracts from his narrative may prove interesting:—

"The same day, about two or three o'clock in the afternoon, we went on shore, where we found an exceeding fair and pleasant valley, wherein divers handsome buildings and houses were set up, and one particularly, which was a church, was tiled and whitened on the outside very fair, and made with a porch; and within the church, at the upper end, was set an altar, whereon stood a very large table set in a frame, having on it the picture of our Saviour Christ upon the cross, and the image of our Lady praying, with divers other histories painted curiously on the same. The sides of the church were hung round with stained cloths, having many devices drawn on them. . . . .

"The valley is the fairest and largest low plot in all the island, and is exceedingly sweet and pleasant, and planted in every place either with fruit or with herbs. . . . .

"There are in this island thousands of goats, which the Spaniards

call cabritos, which are very wild ; you shall see one or two hundred of them together, and sometimes you may see them go in flocks almost a mile long ; some of them (whether it be the nature of the breed of them or the country, I know not) are as big as an ass, with a mane like a horse, and a beard hanging down to the very ground : they will climb up the cliffs, which are so steep that a man would think it impossible any living creature could go there. We took and killed many of them for all their swiftness, for there are thousands of them upon the mountains."

*Hakluyt.*—In 1593 Sir James Lancaster called at the island, and relates finding a Suffolk man, named John Segar, who had been left there for misconduct by some other ship ; it appears the poor fellow was so filled with joy at the sight of his countrymen, and at hearing the sound of his native tongue, that he lost his senses, and eventually died.

St. Helena now appears to have been frequented by English, Dutch, and Portuguese ships until 1650, when it was appropriated by Holland, but abandoned shortly afterwards for the more promising settlement of the Cape of Good Hope.

The English succeeded the Dutch, and in 1658 a fort was built in James Valley, on the site of the present castle. The Dutch, however, were not disposed to give up the place so easily, and, in 1672, aided by the treachery of one Bennett, a planter, they effected a landing at Swanley Valley, to the north-west, and, marching up the country, defeated the garrison and turned the defences of the town. Fortunately, however, the Governor and a portion of the troops escaped to sea, and were enabled to detach a cruiser to warn off all English ships.

In 1673 Captain Munden's squadron was sent to recapture the island, and happily fell in with the cruiser, on board of which was one Black Oliver, a slave who had been born on the island ; he piloted the ships to Prosperous Bay, on the windward coast, where a body of 200 men were landed under Captain Kedgwin, who succeeded in scaling the almost inaccessible cliffs overhanging the bay—an exploit still commemorated by a precipitous rock called "Hold Fast Tom," from a caution given to the gallant blue jacket who first ascended to fix a rope for his comrades. Whilst this party were thus advancing through the island Munden sailed round to James Valley, and opened a cannonade on the unsuspecting Dutchmen, a simultaneous attack being carried on from the heights. Tradition asserts that the men were landed from the yard-arms of the ships ; but at all events the Dutch surrendered, and Munden was knighted for his gallantry, and his name handed down to posterity by the erection of a fine work on the cliffs to the eastward of the anchorage, now Munden's Battery.

In 1673 a charter was granted to the East India Company, giving them a sovereign right over the island, and a kind of feudal service was adopted for its defence.

Dampier visited St. Helena in 1691.

Slavery appears to have been exercised with great cruelty about this period, and the island seems to have been in a very unsatisfactory state, several mutinies taking place, one of which deserves to be recorded, as the Governor was shot and the mutineers escaped to sea with all the Colonial treasure.

Notwithstanding these disorders, the East India Company exerted themselves most laudably for the improvement of the cultivation and resources of the island: numerous exotics were introduced, and the visitors to St. Helena in the present day cannot but be agreeably surprised at the variety of beautiful trees and plants in the Government gardens and the private dwellings of the planters.

Dr. Halley visited St. Helena in 1761 to observe the transit of Venus, but, unfortunately, without success; the phenomenon being obscured by clouds at his place of observation (Halley's Mount), although distinctly visible from the lower elevation of James Town.

Napoleon Bonaparte arrived here in *H.M.S. Northumberland* on the 15th October, 1815, and died at Longwood House on the 5th May, 1821. The circumstances of his captivity are too well known to demand repetition. His body was interred in Sane Valley, beneath a group of willows—his favourite haunt during his lifetime. The exhumation took place on the 15th October, 1840; when the remains appeared almost untouched by the hand of time, and it is stated that the features recalled to mind Napoleon in his palmy days, so different appeared their expression from that of the last few years of his life.

The Longwood estate and tomb have lately been purchased by the French Government, and a French officer appointed as guardian. A model of the equestrian statue at Cherbourg is to be sent to the island.

St. Helena was transferred from the East India Company to the Crown in 1836, for 100,000*l*.

The island has lately been erected into a bishop's see, to include Tristan d'Acunha, and the English establishments on the coast of the Brazils.

St. Helena, from its position in the South Atlantic Ocean, lies in the strength of the south-east trade wind, and is usually sighted by ships at a distance of 20 leagues, rising like a huge fortress from the bosom of the ocean. It is surrounded by a wall of precipitous cliffs from 1000 to 1800 feet in height, intersected by chasms serving as an outlet for the watercourses of the island, and

terminating in small coves more or less exposed to the fury of the waves. There are no less than twenty-three of these openings around the coast; but landing is almost impracticable, except on the north-western or leeward side, and at Prosperous and Sandy Bays to windward, and even then only in favourable weather.

The most singular phenomenon connected with this part of the ocean is the setting in of very heavy continuous swells, called "rollers," from the north-north-west, particularly during the month of February, when the waves burst on the leeward shore with astonishing grandeur and impetuosity. During their continuance landing is extremely dangerous, and can only be effected by watching the intervals between the swells. In February, 1846, thirteen vessels, moored at half a mile from the shore, were totally wrecked, and the wharves and batteries suffered considerable damage. No satisfactory solution appears to be given for this phenomenon, and a suggestion that simultaneous observations should be carried on during the period of "rollers" at Ascension, Tristan d'Acunha, and St. Helena, appears to offer the most practical method of arriving at anything like an explanation of the cause.

The island is divided into two unequal parts by a lofty ridge of mountains from 2000 to 2700 feet above the sea level, extending in a semicircular sweep from S.W. Point to Stone Top Point at the S.E. The principal eminences on this range are—High Peak, 2635 feet; Diana's Peak, 2704 feet; Actæon's Mount, 2700 feet; Little Stone Top, 2380 feet. Numerous spurs branch off from this ridge: those to the N. and N.E. decreasing in altitude, but increasing in extent, as they approach the sea, where they terminate in precipitous cliffs, and form the boundaries of the deep valleys debouching on the coast. The spurs from the S.W. of the ridge are suddenly broken about one mile and a half from their commencement, the land which they originally supported having subsided, leaving but a wreck of the original formation, with here and there towering fragments of basalt, like the buttresses of a gigantic ruin. The appearance of this part of the island is magnificent in the extreme; and to a spectator on the ridge above presents a variety of form and richness of colour baffling description. Every attention has been directed to the proper delineation of this district in the map, and to resolve the apparent chaos into a system of unity.

The island appears to have suffered at different periods from the effect of volcanoes and earthquakes. General Beatson supposes that it is the shattered remains of an ancient continent, connected in former ages with the other rocks of the Southern Atlantic. The district of flat country, comprising the plains of Longwood and Deadwood to the E. of the island, would seem to support this theory, particularly as an indigenous tree (*Conyza gummifera*)

which grows here is also found on Tristan d'Acunha. The remains of a vast crater are (*vide* Seale's Geognosy) to be traced between Flagstaff Hill and the Barn Rock, N.E. of Longwood; but I did not observe any other formation in the island to answer the description of a crater.

Limestone is found in different parts of the island, viz., Rupert's Bay, Sugar-Loaf Point, and Potato Bay, that from the last-named place being of excellent quality.

Gypsum is found near Prosperous Bay.

Carnelian in Turk's Cap Bay.

The honey-combed (amygdaloidal) basalt and red tufa afford excellent building material.

A layer of fossil shells (univalves) have been discovered near Flagstaff Hill, 2000 feet above the sea.

The botany of St. Helena is interesting, affording nearly sixty species of indigenous plants, the most remarkable of which are—the *Island Ebony* (*Dombeya melanoxylon*), now nearly extinct, but found in the shape of gnarled and broken trunks on the hills to the s.; the *Red Wood* (*Dombeya erythroxylon*) is also almost extinct; *String Wood* (*Acalypha rubra*); the *St. Helena Tea* (*Beatsonia portulacifolia*) is only found on the summit of Sandy Bay Barn and the flanks of High Knoll; also ferns of great beauty. Trees and shrubs from all parts of the world have been collected in the gardens of Plantation House, where the oak, bamboo, aloe, pine, &c., flourish together.

The main ridge of the island is covered with a luxuriant vegetation of tree ferns and cabbage wood (*Solidago cuneifolia*), nourished by a constant moisture.

Upon descending from this elevation we find the hillsides clothed with the richest grass, and the watercourses overhung with bramble and fuchsia; lower down, woods of Scotch fir, larch, oak, and the Port Jackson willow. On approaching the sea vegetation gradually disappears, the summits of the hills within  $1\frac{1}{2}$  mile of the coast being almost barren, with a scanty growth of samphire (*Salsola salsa*). In the valleys, however, where water can be procured, the gardens produce abundance of fruit and vegetables, especially pumpkins and bananas. The island appears favourable to the growth of coffee and cotton, particularly in the valleys to the south of the main ridge, which are well irrigated and extremely fertile.

A considerable quantity of rock orchella was exported in 1851, but of inferior quality to that found in the Cape Verde Islands.

The flocks of wild goats which existed in the island at the period of the visit of Cavendish have dwindled down to a very small number, a few being shot from time to time on the heights near Sandy Bay. Sea-fowl and guinea-fowl are also extinct, but

the ravines are the resort of numerous coveys of the red-legged partridge, and the pheasant frequents the thick cover on the higher ridges. An indigenous bird, resembling the sandlark, with long legs and grey body and wings, called by the islanders the "wire bird," is found here. Doves, Java sparrows, amaduvades, and canaries inhabit the gardens, the last-mentioned being remarkable for the richness of their tone.

The rocky islets round the coast swarm with sea-birds, particularly the beautiful white bird (*Procellaria nivosa*); and the man-of-war-bird and tropic-bird are to be seen wheeling their flight high above the lofty pinnacles of the island.

The shores abound with mackerel and albacore, the principal food of the poorer inhabitants. Sharks of great size and voracity are now and then captured; and during the month of August schools of whales (black fish) are frequently seen, affording many an animated chase to the boats of the American whale-ships.

Cattle are constantly imported from the Cape of Good Hope, although the island is capable of supporting a large number, the stock in 1857 amounting to 1625 horned cattle and 4230 sheep. The quantity of pasturage is 7652 acres.

No snakes or reptiles, except a few centipedes and scorpions, are found on the island. Rats, however, are a terrible plague, and nothing is safe from their depredations.

**CLIMATE.**—The temperature varies according to the altitude and exposure of the different places in the island: at High Knoll, 1900 feet above the sea, from 65° to 70° Fahrenheit; Ladder Hill, 600 feet above the sea, 70° to 80°; and in James Town about 5° higher. The trade, however, is a constant ventilator, and keeps down the temperature to reasonable limits.

A great deal of rain falls on the higher parts of the island, the wettest months being June, July, August, and September. The annual rainfall is about 27 inches.

The magnetic variation is now 25° w., varying about 5' annually. Observations were carried on from 1840–1850 by the officers of the Royal Artillery at the Observatory at Longwood, the results of which have been since published.

#### STATISTICS—1857.

**Acreeage.**—30,300; of which—uncultivated, 22,166; pasture, 7652; crops, 482.

**Live Stock.**—Cattle, 1625; sheep, 4230; horses, 230; goats, 670.

**Inhabitants.**—Males, 2973; females, 2517: total, 5490.

**Garrison.**—Artillery, 78; infantry, 382; militia, 322.

**Finance.**—Revenue, 19,837*l.*; expenditure, 19,079*l.*

XXIII.—*Progress of the British North American Exploring Expedition.* Under the command of Capt. JOHN PALLISER, F.R.G.S.\*

Communicated by the Right Hon. Sir EDWARD BULWER LYTTON, M.P., H.M.'s Secretary of State for the Colonies.

No. 1.

Read, February 14, 1859.

Fort Garry, Red River, May 3, 1858.

SIR,—I have the honour to report my arrival at this post, on my way to join the Expedition, and recommence my explorations this year from Fort Carlton.

I shall still be obliged to wait for some days until the grass is sufficiently forward to enable me to proceed on horseback.

Although the snow has disappeared, yet, owing to the cold northerly winds that now prevail, the grass is still quite as backward as it usually is at this period of the year, although the winter has been an extraordinarily mild one; I hope, however, that I may be able to start on or about the 10th instant.

I accomplished my voyage from Crow Wing, in Minnesota territory, to this place in a month, in a canoe, assisted by two half-breeds. We punted up the Crow Wing and Leaf Rivers, carried the canoe across the height of land from Leaf Lake to Ottertail Lake, but in attempting to cross the latter to the south shore we narrowly escaped being crushed in the ice; however, we extricated ourselves, and were consequently obliged to extend our portage along the eastern shore round to the mouth of Ottertail River, the principal head of Red River. Down this river we ran all the rapids but one, making there quarter mile portage, joined the main stream of Red River at "Bois des Sioux," and came down to Fort Garry.

I have the honour to enclose you Lieutenant Blakiston's letter on the subject of the Hudson Bay and York Factory voyage up to Carlton on the Saskatchewan; likewise Dr. Hector's Geological Report of 1857, which I will thank you to be so kind as to place in the hands of Sir Roderick Murchison.

I shall forward Mons. Bourgeau's Report on the botany and flora of the country, with a request to have it placed in the hands of Sir William Hooker.

I have likewise received the map of the country, copied out by Lieut. Blakiston from the detached charts we ourselves made on the route. Unfortunately he made but one copy, and as I have not the means here of making a copy for myself, I will likewise defer forwarding it until after my arrival at Carlton.

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\* See 'Proceedings' Royal Geographical Society, vol. ii., pp. 38 and 146; also vol. iii., p. 122.—ED.

I have the honour of forwarding the Astronomical Observations enclosed in a letter from my Secretary, Mr. Sullivan.

I have, &c.,

JOHN PALLISER, Captain,

Commanding N.W. American Exploring Expedition.

*Her Majesty's Secretary of State  
for the Colonies.*

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*First General Report on the Geology of the Country examined by the Expedition during the Season of 1857.*

THE journey made by the Expedition during the first season has embraced two very different methods of travelling, marking regions of distinct geological structure and physical appearance. The first of these is the canoe route from Lake Superior to Lake Winipeg; the second, the journey across the plains from Fort Garry to Fort Carlton.

The general structural features of the country travelled over on the canoe route, so far as they can be learned from a single line of traverse, have already been well described by Mr. Keating, Sir John Richardson, Dr. Bigsby, and others; but from the complicated relations of the rocks of which it is composed, no detailed observations can be of any value until they are extended in every direction by means of an elaborate topographical and geological survey.

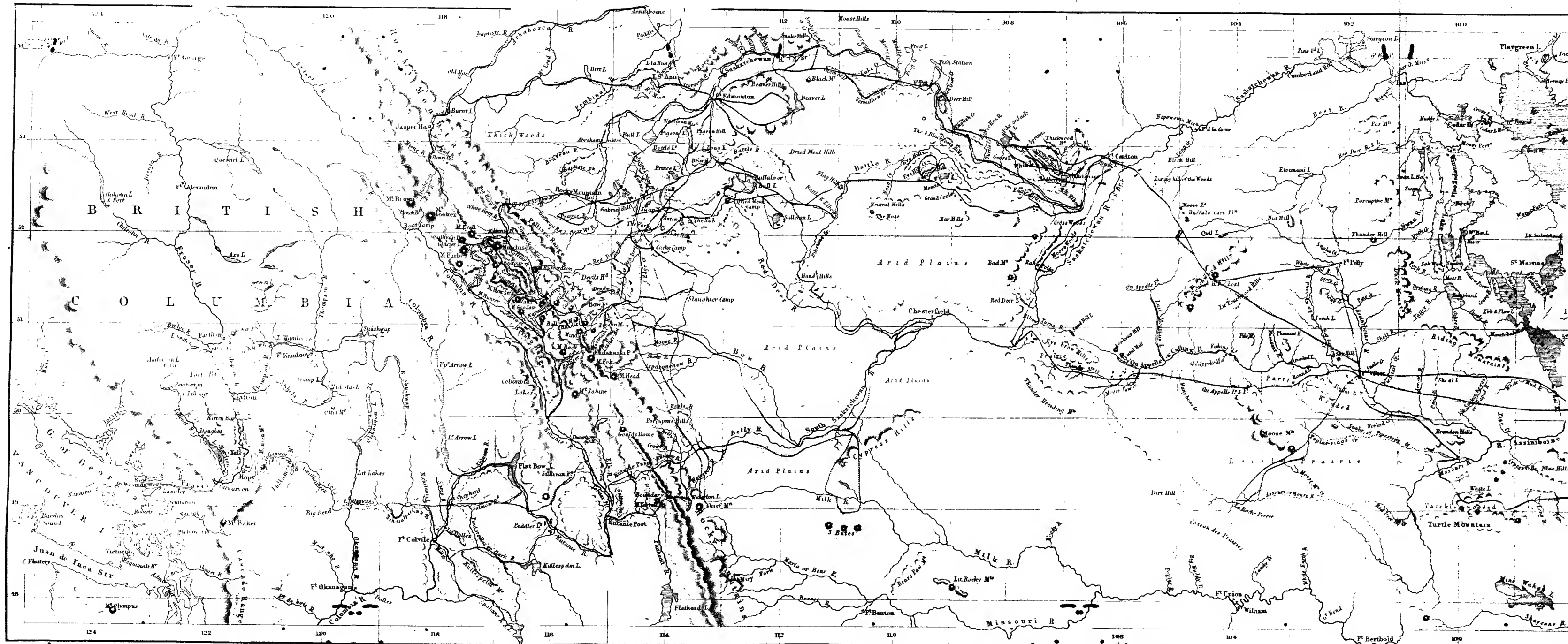
The whole of this district is occupied by a primitive axis, the intermediate primitive belt of Sir J. Richardson, which is composed of gneiss, mica schist, and other metamorphic rocks, with intrusions and outbursts of granite, probably of very different ages. From observations made in the course of our journey, it appears that there are two distinct directions of strata in the rock which compose this axis, marking it into two districts, one from Lake Superior to Rainy Lake, the other from Lake of the Woods to Lake Winipeg. Not only the general strike of the altered and upheaved rocks in these two districts, but also the direction in which the water courses affect the principal descents, and the manner in which the lakes in each of them are arranged, all indicate a different direction of the elevating and disturbing force, in other words, two different axes.

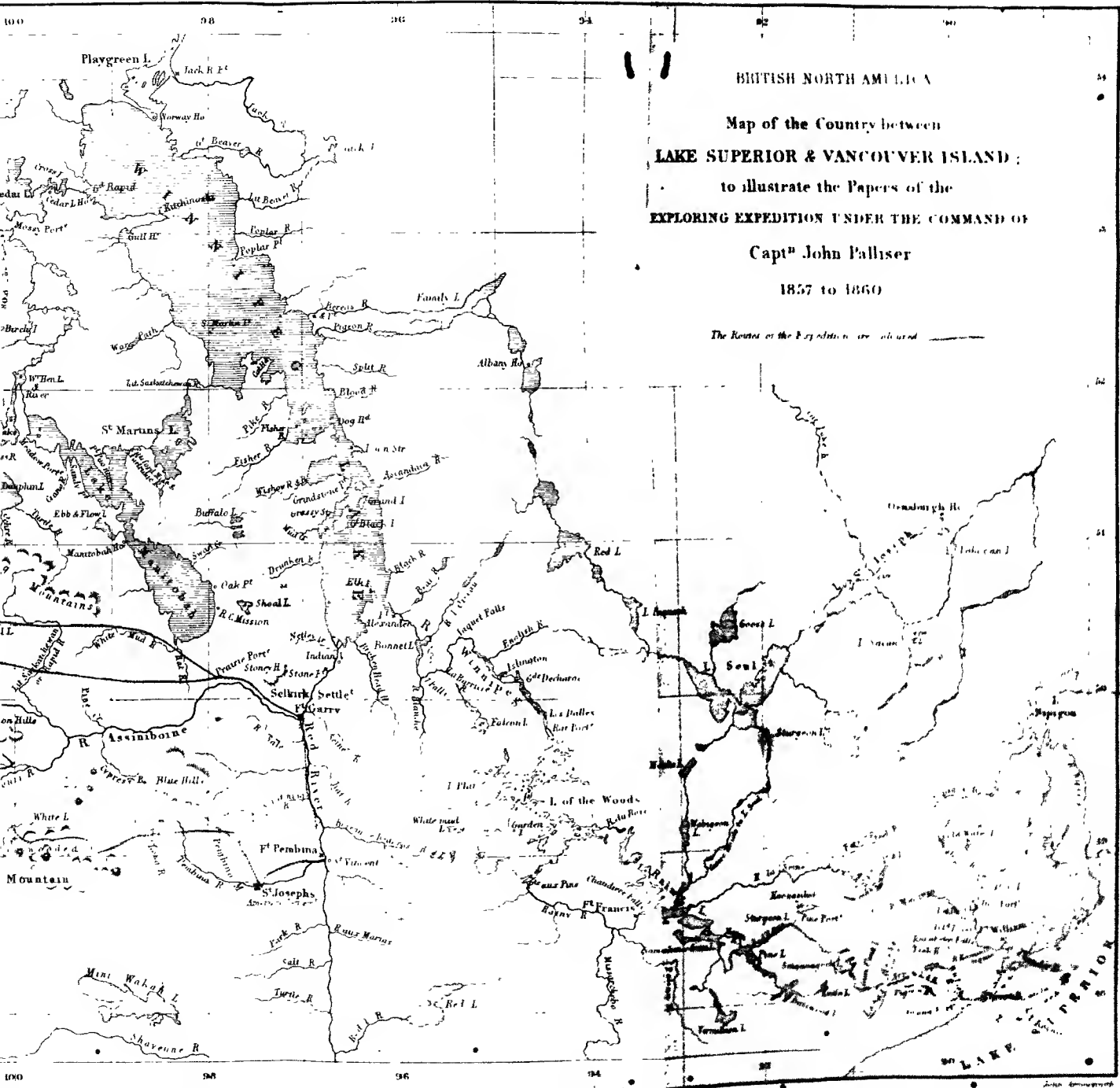
These seem to converge towards the south, including an angle of about 25°, the eastern one being directed from the north-east to south-west, while the western one lies much more nearly north and south. In each of these there is a great central district, where nothing but rounded bosses of granite are seen occurring as ridges and islands, which rise little above the level of the flooded country in which they occur. On either side of these two granite districts metamorphic rocks are ranged, with great seeming irregularity as regards their order and dip, but still on the whole preserving their direction very consistently with the bearing of either of the two axes to which they belong. There are besides many minor outbursts of granite as dykes and intrusions, but they do not seem to interfere with the above-mentioned general bearings of the country.

In the district between Lake Superior and Rainy Lake the summit level is reached by an abrupt and rapid ascent in a direction at nearly right angles to the main eastern axis. Then follows a long traverse, almost along the summit of that axis, and then an abrupt but comparatively short descent to Rainy Lake again at right angles to the axis.

The first great step in the ascent from the east is made at the Kakabica







BRITISH NORTH AMERICA

Map of the Country between  
**LAKE SUPERIOR & VANCOUVER ISLAND :**  
to illustrate the Papers of the  
**EXPLORING EXPEDITION UNDER THE COMMAND OF**  
**Capt. John Palliser**

1857 to 1860

The Routes of the Expedition are indicated



Falls, where, from a succession of faults which mark the commencement of the more highly metamorphosed rocks, a sudden elevation is effected, the summit level of which is 179 feet above Lake Superior at Fort William.

About one mile below the fall a fine section is exposed in the form of a cliff 130 feet high, crossing the country from north-east to south-west, consisting of a dark argillaceous schist in thin fissile beds from one to two inches in thickness, very much jointed, and having many small veins of quartz, and sometimes calc spar, included both in the lines of bedding and in the joints. These beds are quite horizontal, and through their whole thickness the river has cut its way back to the present position of the fall in a manner similar to that in which the river-bed below the Niagara Falls has been formed. At Lazy Portage, and at various points in the River Kaministiquia below the fall, and also at several of the rapids in the lower part of the White Fish River, small sections of the same beds were seen, but all dipping to south-south-east at  $30^{\circ}$ . But on ascending the latter river to a point south-west from the Kakabica Falls, there a section is exposed of the same strata, horizontal, like these at the fall, but only five feet high. Again, on the River Kaministiquia, above the fall at Friar's Portage, the strata have acquired an almost vertical position, and a little farther on, at Lower Island Portage, are found to be dipping at an angle of  $40^{\circ}$  to south-south-east, and to have become changed in character, having mica developed in them, and also greater abundance of quartz veins than before. Immediately afterwards in the course of the ascent true granite occurs, and after several alternations, the schistose flags reappear at Upper Island Portage, but now dipping at a high angle to the north-west.

From the Falls to the Dog Lake the ascent of the river pursues a northerly course, crossing the beds obliquely by a succession of minor falls, giving rise to scenery of unequalled beauty. At the Dog Portage another sudden rise takes place in the water level, for the rocky high grounds, which for a long way below have been skirting the river at some distance, forming as it were the limits of a wide valley, here converge and form a granite barrier across the river, the summit of which is about 719 feet above Lake Superior, and 440 feet above the river at the lower end of the portage, but only 140 feet above the lake level at the upper end, thus making a rise in the water level of 297 feet in the short distance two and a half miles. As the portage road passes right over the top of this hill, and leads to a point on the lake far from the exit of the river, the nature of the falls which produce this sudden change in level could not be examined, but the mass of the hills seem to be granite. Although this is not the highest point of land over which we passed during the route, still it is probable that this hill is as high as any portion of the rocky axis of the country, as those along the lake are even inferior to it in elevation, while the ascent which is made after leaving the upper end of Dog Lake is through a swampy country covered with drift. In fact, after leaving Dog Lake until a considerable descent has been made to the west, no rock is exposed, the whole summit level being covered with a thick deposit of drift, as will be afterwards described.

From the Lake of the Thousand Isles, where the rocky flooring of the country is again uncovered, until Sturgeon Lake is reached, the descent is very slight; and by referring to the map (Sheet 1) it would be seen that the route follows a chain of small lakes, which are in most cases detached from one another, being separated by rocky barriers, over which the canoes and cargoes are carried. In many cases the lakes are at exactly the same level at each end of the portage, and the greatest difference between the two ends of any of these portages is only about thirty-five feet, so that the total descent in this part of the route cannot amount to very much. This chain of lakes may, in fact, be considered as occupying a line parallel with the summit of the water-

shed, and the country in which they lie is almost wholly composed of granite, occurring in broad rounded eminences, nowhere rising to 100 feet above the level of this half-drowned country. It is probable that this granitic belt is expanded considerably where the Old Portage route crosses it, and that the whole chain of lakes between Lake Rasiganagah and Sturgeon Lake lies within it. It is this belt which will form the great obstacle to the formation of any kind of road across this watershed.

From Sturgeon Lake in Bad River there is a considerable descent to the south, which forms the only exception to the general north-westerly descent of the waters to Rainy Lake.

From the Lake of the Cross to Lake Namucan the descent is rapid, and the river channel crosses the strata of gneiss and bedded greenstones at right angles, following a direction of the dip.

Rainy Lake has its length agreeing with the strike of the strata, which is here more nearly east and west than before.

Between Rainy Lake and the Lake of the Woods the superficial deposits again cover all rocks from view, and when the north end of the latter lake is reached, and they are again exposed, their general strike is now changed to almost north and south, agreeing with the greater axis of the lake, just as Rainy Lake agrees with the strike of the eastern district. The descent from the Lake of the Woods to Lake Winnipeg is by successive groups of falls, between which the river forms lake-like expansions, which lie generally at right angles to its main course.

The first part of the river Winnipeg flows across vertical strata, and then enters a granitic district very similar to that passed through between the Lake of the Thousand Isles and Sturgeon Lake.

The exact western limit of the axis at Lake Winnipeg was not seen, but the quantity of loose unworn fragments of lower Silurian limestone scattered about on the banks of the river and on the shore of Lake Winnipeg indicate the immediate neighbourhood of these strata. At the Seven Falls a large ortho-ceratite was found among the shingle on the river margin.

The distribution of the drift on this axis is very interesting. On the east side for a considerable way above the Kakabica Falls the country is covered with an alluvial deposit of red marl earth. Along the Kaministiquia this forms the high terraced banks of the river; for instance, opposite the mouth of the White Fish River, there are three of these terraced levels at the elevations above the river of 20, 60, and 90 feet. There are scarcely any boulders in this deposit, and when any are seen they are in spots from which this alluvial deposit has been removed and the underlying rock surface exposed.

On the summit level there is a great deposit of drift, consisting of coarse red sand with many boulders large and small. This deposit forms a flat swampy plain level, and well wooded towards the west, but towards its eastern margin, as at Cold Water Lake, worn into deep dry gullies and round pot-holes or conical depressions without any exit. The thickness of this deposit must be about 200 feet. The highest level of it measured was 8-3 feet above Lake Superior.

The banks of the lower part of Rainy River are composed of a rich alluvial deposit of a light grey colour, containing a large proportion of white sand. It is distinctly stratified in some parts, and is only elevated about ten feet above the river level; no boulders occur in it. As a very slight rise in the level of the Lake of the Woods or a depression of Rainy Lake would suffice to connect these two lakes along the course of this river, it is not improbable that this deposit has been formed in such an extension of the former lake. But the upper part of the same river has the banks high and terraced, and boulders are plentiful, showing that at this level there is also a deposit of true drift.

Below the Seven Portages on the Winnipeg River there again the river flows

through a smooth channel, and the banks are composed of a deposit of soft white marl earth, the river being at first only slightly depressed, but soon from its rapid descent the banks become high as the level of the deposit remains the same. At Rat Portage, however, it retires from the river on either side, and below the falls at that place is replaced by another on another level through a cutting in which the river runs to its mouth at Fort Alexander. The banks of the lower part of the river are very distinctly terraced.

The estimated levels of the drift deposit at Rainy River, the Seven Portages, and at Rat Portage, are respectively 450, 350, and 270 feet above Lake Superior, and deducting 195 feet from each, as the probable elevation of Lake Winnipeg above that lake, we have the levels above it at 255, 155, and 75 feet.

Glacial scratching was very distinctly seen at many points on the route. The direction is almost always north and south. Hardly a surface in the two granitic tracts did not present distinct scratchings. They were seldom to be seen, however, on the southern exposure of rock surfaces, if these sloped much; but the more a surface with a northern exposure sloped, the better they seemed to be marked.

A map has been prepared of the country traversed by the expedition between Fort Garry and Fort Carlton, on which the results obtained have been as far as possible laid down.

The country around Fort Garry is a level plain of drift, which consists of a light-coloured marly loam rather deficient in sand, with beds of white tenacious clay. Only a few boulders are to be seen scattered over the surface of this plain, generally angular fragments of the Fort Garry limestone of large size. At the Settlement the river is sunk from 40 to 70 feet below the level of this plain, but nearer its mouth it flows through a level swampy country, elevated only a few feet above its surface. At the Lower Fort, 18 miles below Fort Garry, which latter is situated at the junction of the Assiniboine with Red River, there is a section of magnesian limestone exposed in the bed of the stream when the water is low, and which is then quarried for building purposes. As the river was high when we were there, this section was not visible; but from among the fragments lying on the bank several fossils were obtained, such as *Favosites*, *Septena*, &c., and some poor specimens of *Receptaculites*. Major Seaton, the officer in command of the troops stationed at the Upper Fort, kindly offered to make as complete a collection as he could when the state of the river allows of the beds being examined, and when the search will be facilitated by the labours of the quarrymen. This limestone is of a light buff colour with purple blotches, very hard and with a sharp angular fracture. At Stony Hill, about 15 miles north-west from the Upper Fort, there is an isolated bluff of limestone, rising from the plain level to the height of 80 feet. The south and western exposures are abrupt and water-worn, it having evidently been at one time an island; and, indeed, during the great floods which have several times inundated the Settlement, it has been one of the few spots upon which the inhabitants can take refuge, reaching it by means of boats. The beds of limestone are horizontal, or nearly so, and are slightly different from those at Fort Garry in their mineral aspect, having a more crystalline fracture and the colour being of a reddish hue. No fossils can be discovered in newly-fractured portions, but on the weathered surfaces a few obscure remains of fossils are to be seen projecting along with siliceous and gritty particles from a dull floury surface.

After leaving Red River, along the whole route to Fort Carlton, at only five localities were any of the strata observed which must underlie the drift throughout this vast extent of country. At Long River, lat.  $49^{\circ} 8' N.$ , long.  $98^{\circ} 35' W.$ , a tributary of Pembina River flowing northwards, and again at Forked Creek, a deep gully that joins the valley of the Assiniboine in lat.  $50^{\circ} 6' N.$ , long.  $101^{\circ} 18' W.$ , sections were observed of a compact shale, of a

light greenish drab colour, not occurring in continuous layers, but as fragments with irregular conchoidal surfaces which have been produced by the desiccation of what was originally thin continuous beds of clay. Sometimes it makes a nearer approach to a slaty character. Among these beds are bands and nodules of a hard deep brown-coloured clay iron-stone, and perpendicular fissures are common, which are filled up with splintery iron shale. A careful examination of these beds at Long River did not afford any fossils, and a long search of those at Forked Creek only yielded six or seven very minute specimens, among which were scales of fishes (ctenoids?), a small bivalve, and several obscure impressions. Throughout these shales there occurred ochrey calcareous tubes, about half a line in diameter, traversing the layers perpendicularly. At both these places the thickness of the strata exposed amounts to about 30 feet. At Long River they dip to the south, but not with regularity. At Forked Creek the strata are strictly horizontal, and were seen in two creeks two miles apart, having exactly the same characters. No clue could be discovered to their relations with other rocks, as the sections only occurred in deep bands in the creeks, for all else was obscured by drift. At Long River they were covered by about 6 feet of pure white sand, very incoherent, and over this lay the ordinary drift, consisting of light grey calcareous earth. At Forked Creek they were overlaid by about 20 feet of drift.

At Fort Ellice the banks of the Assiniboine are 200 feet high; and at one point there, a recent slide having taken place, a partial section of the bank was displayed. The upper part of this section consisted principally of comminuted fragments of the same *Long River shale*, with local beds of pure sand, also the more common grey drift.

At a part of this slide which was cut by a bend of the river, strata of tenacious calcareous clay were visible, of a dark purple black colour, but with the weathered surface decomposing into a red ferruginous earth. Along with these clay strata were two beds of soft clay ironstone, about four feet apart, the lower one half a foot thick, and rather compact, the upper one concretionary, forming thick nodulated masses, the upper surfaces of which were calcareous, and very like decomposed coral.

At the elbow of the south branch of the river Saskatchewan, at the point where it meets the great Prairie ridge, known farther south as the "Coteau des Prairies," similar clay beds were seen, having the ironstone concretions occurring in great profusion, and in several of these were found fragments of chalk fossils, inoceramus, baculites, and others. As the mineral resemblance to those beds at Fort Ellice is perfect, there can be no doubt as to their similarity in age. At the elbow the section is one of great interest, from the relation of these beds to the drift by which they are covered. Sheet 4 is a sketch map of the river a little above the elbow, with a section exhibiting the manner in which the beds occur. In the section, the pale blue colour represents the soft clay strata, which are almost horizontal, while the ochre tint represents the drift. This latter thins out as it nears the "Coteau," which is probably mainly composed of the clay strata, with only a thin covering of drift on its eastern aspect. As this part of the river was the western limit of our journey this year, this point could not be determined. Seeing that the under surface of the drift lies unconformably with these soft clay strata, it is evident that the eroding agency has had its western limit here, the cause of which was certainly not the hardness of the beds that it encountered. Portions of these soft strata have been formed by the action of the river into conical mounds, which present a most extraordinary appearance. As no grass has time to grow on them, from the constant attrition of their surface, they are perfectly black, and their outline is broken into terraces by the successive lines of ironstone concretions, which, from their hardness, retain the soft strata underneath them. There is a large quantity of gypsum disseminated throughout

these beds, occurring as transparent selenite crystals in radiating groups. There are no large beds or masses of it.

From Fort Ellice a trip was made for a few days' journey to the south-west, in consequence of the reports by the Indians of wonderful stones that occur on the banks of the Assouri River. The place is called by the half-bred hunters *La Roche Percée*. The route followed to this place passed by the eastern end of Moose Mount, which will be described afterwards in connexion with the drift, and of which it seems to be entirely composed. The ascent to the base of this hill was about 400 feet above the Assineboine at Fort Ellice, and in continuing southwards until we struck the Assouri, a descent of about 100 feet was made. Thus the probable height of the plain through a cutting in which the Assouri runs in this place is 300 feet above the Assineboine, while the valley of the river is 165 feet deep, so that the difference of level between the two rivers amounts to about 135 feet.

The direction of the Assouri here is easterly, and Sheet 5 is a rough map of a portion of it, with a view of its north bank. The whole prairie here is covered with a most extraordinary profusion of boulders, which are fragments of granite, gneiss, limestone, &c. In the valley, a group of strata is exposed, a section of which is given in Sheet 6, as follows:—

	Feet.
a. Drift with boulders from .. .. .	4 to 7
b. Mud-stone .. .. .	1
c. Incoherent sandstone, fine grained, with hard concretions impregnated with iron, which weather concentrically .. .. .	10
d. Porous calcareous scinter .. .. .	1
e. Hard dark-blue ironstone shale, decomposing into deep orange-coloured splinters .. .. .	2½
f. Gritty limestone .. .. .	2
g. Ash-coloured clay in thin indistinct layers, very soft, with one bed of coal 9 inches in thickness .. .. .	8
h. Hard blue limestone .. .. .	3
i. Same as g, but with three beds of coal, 10, 8, and 6 inches in thickness .. .. .	15
k. Gritty limestone .. .. .	2
l. Brightly-coloured marls and shales, with selenite in small fragments .. .. .	10
m. Very coarse-grained, incoherent sandstone, more than .. .. .	20

No trace of fossil remains was found in any of these beds to indicate their age.

The coal does not occur as well-defined beds, but graduates into the shales on both surfaces. It is not visible until a light ashy deposit is removed from the exposed edge of the bed, produced by the soft clay washing down from the strata above. The coal is of several qualities, some having quite the appearance of compact cannel coal of fine quality, some like the more glistening bituminous coal, friable, and only to be obtained in small cuboidal fragments, while some can hardly be distinguished from charcoal. Where we crossed the Assouri, between Turtle Mount and Fort Ellice, fragments of similar coal were picked up in the bed of the stream, no doubt derived from these seams. Also at the elbow of the south branch of the Saskatchewan like fragments were found, so that we may expect to meet with similar beds in the course of our journey up that river during the next year. A rough analysis of an averaged specimen of this coal on a small scale gave the following results:—

Aqueous and volatile matter .. .. .	40 per cent.
Carbon .. .. .	50 "
Light orange-coloured ash .. .. .	10 "

In the first of these groups there seems to be an unusual deficiency of tar and coal gas. It burns in the air with difficulty, without flame.



The sandstone which forms bed C. is composed of very fine pure grains of quartz, hardly cohering; but in the upper parts of the bed there occur concretions impregnated with iron and of a reddish hue, which are comparatively hard, and decompose concentrically. It is this irregular disintegration of this bed that gives rise to the curious appearances that have rendered this spot an object of great superstition among the Indians. The lower sandstone wears away from under the hard concretions, which, from their peculiar manner of weathering, assume the forms of compressed spheres, and sometimes long cylinders like the boilers of a steam-engine, and these are left elevated on pillars of the white sandstone. The gullies which join the main valley are thus peopled with grotesque forms, some exactly resembling the ruined nave of an ancient abbey, while those concretions which have just reached the surface, but have not yet become isolated by the disintegration of the bed below, may be taken for gigantic tombstones, and so further the illusion. The sandstone at the base of the section is also very incoherent, but composed of larger grains. The strata are not found in the same proportion and order in different parts of the valley, but they are always horizontal. The thickest bed of coal that was seen was one foot, but the ashy clays were in some places very much thicker than at others. The marly shales have quantities of gypsum embedded with them, but only in small detached crystals. In regard to their probable age the description of the upper beds of the cretaceous system given by M. Jules Marcou in the 75th page of his '*Revue Explicative d'une Carte Géologique de l'Amérique du Nord*' seems to be that of very similar beds to those seen here. The position of "Roche Percée" is lat.  $49^{\circ} 6' N.$ , long.  $103^{\circ} 59' W.$

The whole country traversed by the Expedition during the last year has been overspread by superficial deposits of great thickness. Although these might be all included under the group of Northern Drifts in the ordinary acceptation, still it is probable that they consist of deposits of very different ages and circumstances of deposition. Three boldly marked levels were observed of different mineral composition as well as geographical distribution. To the first of these belong the deposits of the wide flat plain upon which the Red River Settlement is situated; this forms the first prairie level. Its composition is marked by a preponderance of argillaceous marl and a deficiency of sandy matter, and it is invariably stratified in thin layers. Underlying this, at various depths from the surface, is a bed of stiff light-coloured clay, and which forms the immediate margin of the river in many points. The upper parts of the deposit contain leaves and fragments of wood and reeds, and the whole has quite the appearance of a fresh-water deposit, indicating a time when Lake Winnipeg covered a much more extensive area than it at present occupies.

The surface of this deposit must be from 75 to 100 feet above the lake, but it slopes from the west towards Red River, and at St. Joseph, where the second prairie level supervenes, it may be 100 feet higher. The first prairie level has a very irregular outline to the west. Pembina Mount at St. Joseph is formed by the eastern limit of the second prairie level at that place. It follows a northerly course as an abrupt terrace, varying from 200 to 300 feet above the first level for about 30 miles, when it turns to the north-west, and assumes at the same time a more gentle slope, up which our route lay. Sheet 8 is a rough reduction of the larger map, having the different levels exaggerated, so as to render them more distinct. Colours have been used to represent the probable range of these different levels.

The composition of the second great level is very different from that of the first. Sand is the preponderating ingredient. Thus at St. Joseph, where the banks of the river Pembina present a fine section of it, the material is coarse red sand with gravel and boulders, very similar to that observed on the eastern limit of the drift beds on the summit of the water-shed between Lakes

Superior and Winnipeg. There are no signs of stratification in any part of this deposit, as seen at Penibina Mount. Farther west, however, it assumes a light grey colour, and contains a considerable portion of lime. At Fort Ellice, as before mentioned, the upper portions of it consist entirely of fragments of the Long River shale. That the whole thickness of this level at every point is not formed of drift, is proved by the discovery of the shale beds at Long River and Forked Creek, forming as it were a nucleus to it. Notwithstanding that this level is everywhere cut to a great depth by rivers and creeks, very little can be learned of its nature at different points, as slides at the banks of the gullies are but rarely seen. The slide near Fort Ellice of the banks of the Assiniboine has been spoken of in connexion with the beds, probably of cretaceous age, which are visible at the base of it. Another similar slide was seen at the Qu'Appelle Lakes, which are a succession of dilatations of the rivers of that name lying in the bottom of a deep wide valley cut through this second level. This slide did not expose the bank quite to the base, but as far as was visible, consisted of a stiff sandy clay, of a light red colour, with patches of blue clay and gravelly beds. In fact, the characters of this level, as far as regards its mineral composition, seem to be very variable and local. Boulders are tolerably plentiful all over it, but occur in greatest quantity upon the sides and summits of ridges and mounds, which are irregularly dispersed over this level, rising abruptly, and generally to the height of about 50 feet. A great deal of this level is clothed with clumps of poplars. There are, however, some large tracts of bare plain.

The third level is what is spoken of by the hunters as La Grande Prairie. The route of the Expedition did not traverse this level at all, its westerly course meeting it only at the elbow of the south branch of the Saskatchewan, at which place the approach of winter compelled us to turn northward. There are, however, two hills, or mountains, as they are termed by the hunters, viz., Turtle Mount and Moose Mount, which seem to be detached outliers of this level, their summits having nearly the same elevation as that of the summit of this level. These hills are very much alike, consisting of irregularly disposed ridges and cones of very coarse drift, highly charged with boulders. Some of these cones have very steep sides, and rise to the height of 300 feet from their base, and their summits are about 600 feet above the second prairie level. The northern aspect of these hills is very irregular, as also their central mass, being mostly densely wooded, and enclosing numerous small lakes; but their southern aspect is a long gentle slope utterly devoid of trees, and being continuous with the level prairies beyond, which reach as far as the true eastern limit of this level, the "Coteau de Prairies."

The Great Prairie ridge of the hunters has a direction from north-west to south-east, with its northerly aspect very much furrowed in the same manner as has been mentioned in reference to its two outliers, Moose Mount and Turtle Mount. At Roche Percée this ridge was about ten miles to the south, and the extraordinary profusion of boulders at that place, and the thin layer of drift which covered the coal-bearing strata, together with the facts which were observed with a similar proximity to the "Coteau" at the elbow of the Saskatchewan, all indicate that the drift has at the "Coteau" its south and westerly boundary.

JAMES HECTOR, M.D.

Fort Carlton, December 14, 1857.

Fort Carlton, Saskatchewan, June 7, 1858.

SIR,—During the latter half of last October I proceeded to Fort Pitt and obtained the horses which you had ordered at that place for the service of the Expedition. On my return I made observations for latitude and longitude at

various places on the route, and constructed a rough map of the country between Forts Pitt and Carlton.

I found on my arrival at this place, that Lieut. Blakiston was busily engaged making preparation for carrying on a system of magnetical and meteorological observations during the winter months. We commenced the observations on November 12, each member of the Expedition taking six hours' watch during the day and four during the night, in rotation. I continued on duty at the Fort until February 25, when a scarcity of provisions being felt, I proceeded to Pike Lake, where fish at least could be got. While I remained at the lake, which was from March 1 until April 2, I was employed chiefly in obtaining fish, and in that short time caught upwards of 100 jack fish, besides a few white fish.

There has been a great scarcity of provisions throughout the Saskatchewan district; the Indians have been reduced to eating their horses, and hunting wolves and foxes for food, as not a single buffalo has appeared for many miles on either side of the river, except at Edmonton, where they have been so thick as to defy the hunters running them.

On April 1, Dr. Hector, who according to your orders had been to Edmonton on business connected with the Expedition, arrived at Pike Lake on his way to Carlton; so I accompanied him to this place, where we arrived on April 7.

Throughout the winter, as previously, I have kept up regularly the journal of the Expedition, and although it is meagre in detail during the depth of winter, yet as the spring advanced I have been very careful to note everything characteristic of its advancement. In addition I have taken the temperature of the river daily from the breaking up of the ice till now, and noted either its increase or decrease of volume very carefully. I learn from Dr. Hector that he has a number of like observations which he took in the autumn before the ice formed on the river, so an interesting comparison may be instituted between the two sets of observations.

During our stay at Carlton I have made a complete series of observations for latitude and longitude, and frequently in the winter I have taken observations to ascertain how my chronometers behaved. Thirteen lunar distances are worked for the longitude of this place, and I have as many more yet to work.

In the many spare hours which I have had in common with the other gentlemen of the Expedition, I have collected a large number of insects and other animals and various shells, for the purpose of getting them forwarded to England. There is one squirrel in the collection which is undoubtedly new; it resembles the *Arctomys Hoodii*, but is much smaller, and is not patched with light hairs on the dark stripe as is that animal.

I have, &c.,

Captain PALLISER, Commander of  
*North British American Exploring Expedition.*

J. W. SULLIVAN,  
Secretary to Expedition.

*Observations of the Temperature of Soil at various Depths, and the Depth of the Frozen Ground.*

Fort Edmonton, 1858.

1. On the 22d February commenced digging a hole in the field behind the fort, on the top of the high bank on which the mill stands. In three days reached the depth of 4 feet 6 inches; ground still hard frozen. The digging was discontinued in consequence of the man being required for something else.

2. March 3d. The digging recommenced to-day, but as the ground must have frozen in the bottom of the old hole, a fresh one has been commenced 6 x 4 ft. in the same field, but on a level with the fort, at a distance of 12 yards

from the pickets. The soil is the same as that displayed in the last hole; dark loam for 9 inches, then a yellow reddish earth, enclosing fragments of the beds associated with the coal, also angular pieces of the coal itself, rounded fragments of gneiss, quartz, &c.

March 4th. The hole is now dug to the depth of 4 feet 10 inches, the last 3 feet through fine light red sand, which was so dry as almost to look like unfrozen earth : however, it got so much softer, and broke down so fine after it was extracted, that there is no doubt that it is still frozen. But besides, a bed has been reached of a white earthy clay, including fragments of coal, so hard frozen as to resist the pick and the borer, and which on being thawed softens completely.

This afternoon I bored a hole with the auger in the bottom of the dug hole, and intended to carry it down three feet, but the clay bed proved too hard for the auger to pierce; so after I got down three inches, I placed the thermometer in it, packed it round with soil, and then filled the large hole with a foot or two of hay to prevent the temperature of the atmosphere during the night from influencing it.

March 5th. Thermometer, at 5 feet, at 8 a.m., 30°; surface, 20°.

The unfrozen soil was at length reached to-day, at the depth of 7 feet 6 inches, in a bed of sand with rounded stones, and the line of frozen soil was easily perceived. The hole is dug for 4 inches below it, and then 4 inches more were bored, and the thermometer placed in it at the depth from the surface of 8 feet 2 inches.

March 6th. Therm., at 8 a.m., 33° (at 8 ft. 2 in. from surface); surface, 38°.  
 " " at noon 33° " " " 49°

3. "March 2d. In the field behind the fort, at a short distance from the pickets (20 feet), bored a hole one inch in diameter to depth of two feet, placed thermometer at bottom, having its bulb covered with tow, and being enveloped in a metallic case; then rammed in a plug of tow above it so as to prevent the air having any access to it. The following are the readings of thermometer:—

March 3d, at 8 a.m.,  $18^{\circ}\cdot5$ ; surface,  $20^{\circ}$ .

„ at noon,  $18^{\circ} \cdot 5$  „  $24^{\circ}$ .

"	3 p.m.	18°·5	"	24°.
"	4 p.m.	18°·5	"	24°.

4. March 3d. Increased the depth of hole to 3 feet, and adjusted the thermometer as in 3. Readings as follows:—

March 4, at 8 a.m.,  $21^{\circ} \cdot 5$ ; surface  $23^{\circ}$ .

" at noon  $21^{\circ} \cdot 5$ ; "  $30^{\circ}$ .

4 p.m. water had filled it, from the melting of the snow, and hot water had to be poured down to get thermometer out.

5. February 25th. After three days' thaw the surface of the field behind the fort is converted into a soft mud to the depth of three inches, and the ground is thawed to the depth of eight inches. This is on a slope where no water has lodged.

February 27th. The ground this morning is as hard frozen as ever again, the frost of twenty-four hours, having a minimum temperature of  $0\cdot5$ , having proved sufficient to re-solidify it to the full depth to which it had been softened.

JAMES HECTOR, M.D.

Fort Carlton, Hon. Hudson Bay Company,  
Saskatchewan, June 8, 1858.

SIR,—In accordance with your instructions, that I should make every effort to engage twelve or fifteen men, and obtain at least fifteen horses, for the use of the Expedition during the next season, conveyed in your letter written from *Touchwood Hill Post*, and dated 16th October last, during the early part of the

winter I made every inquiry as to the facilities for carrying out your wishes. The result of this inquiry convinced me that it was necessary that I should make a winter journey, at least as far as Fort Edmonton, as it is only there that any half-breed population is to be found not under direct engagement to the Hudson Bay Company.

Accordingly having obtained dogs, and completed all other arrangements, I left Fort Carlton on the 14th of December.

Up to this time I had taken my share in the hourly observations which Lieutenant Blakiston was engaged in carrying on, and which commenced on the 12th of November; and previously to that time I made a six days' trip to the north-west for sixty miles, to examine the Thickwood Hills, which bound the Carlton Plains in that direction by an abrupt densely wooded terrace, about 500 feet in height.

From Fort Carlton to Fort Pitt, the next highest Company's post on the river, I found the distance to be 199 miles: the track I followed is about twenty miles longer than the usual one, but was preferred, as it is so much easier for the dogs to follow a track already beaten, than open a new one through the snow. We skirted a range of hills which forms a continuation of the Thickwood Hills to the west, and passed over many lakes, the principal of which are Redberry Lake, seven miles wide and ten miles long, and Jack-Fish Lake, eight miles wide and twelve miles long. At the latter of these I found a small temporary post of the Company's, which was only in the course of erection. I heard here that the buffalo had been very numerous, but that they had all been passing to the south-west, and now none were to be seen but a few straggling bulls.

We reached Fort Pitt on our seventh day from Fort Carlton. It stands on the left bank of the Saskatchewan, at a point where it takes a bend to the north. Before reaching the latter place, however, it makes a great sweep to the south, passing along the base of the Eagle Hills, which I had observed as a blue line skirting the southern horizon.

Fort Pitt is in latitude  $53^{\circ} 30'$  N., and longitude (Lefroy)  $109^{\circ} 10'$  W.

On the 24th of December, accompanied by Mr. Simpson, the gentleman in charge at Fort Pitt, I started for Edmonton House. With the exception of the first day's journey, our road lay along the south side of the river, so as to cut off a great bend which it makes to the north between the two places. The country now passed through was on a much higher level than that before reaching Fort Pitt, agreeing with the summit of the hilly ground which was then skirted, and from this level other hills again rose. The rise of the country to Edmonton, nevertheless, is very inconsiderable, when the distance is considered, hardly amounting to 1,000 feet.

For the first few days after leaving Fort Pitt, we found the plains covered with buffalo; and early one morning I was fortunately at a camp of Indians just as they had filled their pond with about 100 of them, and were carrying on an indiscriminate slaughter. The pond is an enclosure of stakes and branches of trees interwoven, having one broad entrance, which is so constructed that the buffalo, once driven in, cannot again escape. At almost every camp of Indians, of which nine were passed since leaving Carlton, I saw one or more of these ponds, and I believe the number of buffalo killed in this manner in each year throughout the Saskatchewan district is enormous. After the pond is filled they must of course slaughter every animal before they can remove any of the meat.

The country to the south of the river through which we passed is more generally wooded than it is reported to have been some twenty or thirty years ago, but the wood is all of a worthless character, consisting of small poplars, with only a few clumps of spruce in the swamps as Edmonton is approached.

On the 30th of December, our sixth day from Fort Pitt, we arrived at

Edmonton House. The distance I found to be 191 miles. The snow had been rather deeper than formerly, so as to render the rate of travelling slower.

Edmonton House, which is a large establishment, and the residence of the chief factor, who controls the district, is built on a high point on the left bank of the river. There is a windmill behind the fort, and a good deal of land enclosed for cultivation. The river is here 200 yards wide, and enclosed by banks 160 feet high, in which are exposed sections of the beds which contain coal. This coal occurs in three or four beds, the principal of which is from four to six feet thick. It is of very inferior quality, burns with no flame, but rather smoulders away, leaving a plentiful ash. The beds associated with it are of grey sandy clay, containing ironstone nodules, and also argilo-calcareous shales. It is used in the forge at the fort, and is found to answer tolerably well.

The half-breed settlement, where I expected to find men, I found to be situated about fifty miles to the west of Edmonton; but as I learnt that all the population was absent on the plain hunting, I did not visit it at this time.

On the 9th of January I started for Rocky Mountain House, for the first three days travelling due south nearly, and afterwards turning to the west for three days more, arriving at that place on the 14th. The distance I found to be 157 miles, but there was little or no snow on the ground, so that it was very hard work for the dogs. The road lay over a succession of wooded ridges, the western slopes of which were covered with young poplars, while the eastern slopes and the swampy valleys between support a growth of spruce.

From a rising ground, known as Gabriel Hill, I obtained the first view of the mountains the evening before I arrived at the fort.

I found the Mountain House to be an establishment about the size of Fort Pitt, but in a very ruinous condition, owing to its being abandoned every summer, when it is generally adopted as a residence by several families of Indians, who prove anything but improving tenants.

It stands on the left bank of the river, which is 150 yards wide, and about half a mile above the mouth of Clear Water River, a large branch which joins the Saskatchewan from the S.E.

I remained here until the 26th, making excursions in every direction for the purpose of examining the beds exposed in the banks of the main river and its tributary, which are very interesting. They belong to the same series as those at Edmonton, and coal is found abundantly, although no bed that was observed is more than two feet thick. The principal feature of the river here, however, is the occurrence of thick beds of incoherent sandstone of coarse texture which forms cliffs sometimes 100 feet high, overhanging the river, giving it a very different character from the tame sloping banks lower down in its course.

The Mountain House is at the distance of not less than 100 miles from the main chain of the Rocky Mountains, which are nevertheless distinctly seen from it as a chain of snow clad peaks. The principal chain is, however, screened by a nearer range, distant about 45 miles. The view of the mountains occupies the arc of the horizon, from south by east to west by north. The near, or Brazeau range, merges with the main range towards the north, but lying more east and west than the line of lofty peaks, at its southern extremity, it is far distant from them.

I made an attempt to reach this near range, but failed in forcing a road through the dense pine woods with which the whole country is covered.

For a short time after my arrival the place was reduced to great straits for provisions, but a camp of Blackfoot Indians arrived, bringing with them a small quantity of dried provisions so as to give temporary relief.

I met six of the principal chiefs of the Blackfoot Natives, and explained to them the objects of the Expedition, and the course it would likely pursue when passing through their country, and obtained a promise from them that they

would take steps to prevent the young braves of the nation from stealing our horses or otherwise molesting the party. I gave each a small present and a paper in which their promise was embodied. The lat. of the Mountain House is  $52^{\circ} 29' N.$ , the long. by account  $115^{\circ} 2' W.$

By a comparison of observations made with the barometer during my stay, and those at similar times at Fort Carlton, I found its altitude above that place to be 2,029 feet.

The mean temperature for the time I was there is  $10^{\circ}$  higher than for the same time at Fort Edmonton, but for many days a soft south-west wind blew, which does not seem to have affected the temperature at Edmonton in the same degree, which accounts for this great difference.

Having obtained all the information concerning the country which might be of use to you in making your plans for next year, and learnt the names of the best guides, &c., I started on my return to Edmonton House on the 26th of January. In order to obtain a clearer understanding of the structure of the country, I descended on the ice of the river all the way, and found the distance to be 211 miles. As we were only sparingly supplied with provisions we had to go very fast, and reached Edmonton after having slept only three times. The last day of the journey, as we had nothing left to eat, we did not think it worth while stopping, so we travelled 21 out of the 24 hours, and in that time went 90 miles.

The coal-bearing strata are exhibited more or less continuously throughout the whole of this portion of the river, but about 130 miles above Edmonton the last of the sandstone bluffs is seen, and the strata assume the argillaceous character which they present at that place. Sections and a minute description of these strata, along with my journal, will be, however, submitted to you.

The month of February was occupied at Fort Edmonton in making an examination of the surrounding country and other observations. I made an excursion to Lake St. Ann to visit the Settlement and Roman Catholic Mission there, under the superintendence of M. Le Combe. It is 50 miles *w. by n.* from Edmonton, and consists of 45 houses in three little villages on the west shore of the lake, which is about 14 miles long and 7 wide. There is a nice little chapel, but at the time of my visit all the inhabitants, with the exception of three or four families, were absent on the plain.

On the 7th of March I set off to the plains to meet the Freemen, having heard that they were now all together and on their return. I met them in the neighbourhood of Battle River, and succeeded in engaging the guides and men I wanted. These freemen seem to be a thriving class, and have none of that love of personal display and extravagance which is such a blot on the character of the Red River half-breeds.

On the 15th of March I left Edmonton, and continued to descend the Saskatchewan on the ice. Four miles below Fort Edmonton I saw the coal for the last time, and at the distance of 80 miles the associated beds disappear, and the clay strata with the ironstone nodules, which were first seen at the elbow of the south branch last year, and which are of cretaceous age, take their place in the bank of the river, to all appearance having the coal-bearing strata conformably superimposed.

As we approached Fort Pitt we found the snow on the river, and also all over the country, to be very deep, so that for the first time throughout the whole trip we had to take snow shoes in earnest, which says a great deal for the unusual mildness of the winter, or rather the absence of snow, for the cold at some periods was very severe. I found the distance by the river to be 251 miles. The heat of the sun, from melting the surface of the snow, caused us to travel during the night, and rest in the day, during this part of the journey. I arrived at Fort Pitt on the 21st of March, but finding that letters had missed me on the road, I had to wait there until the 30th. The ice on the river was

now getting so bad that it could no longer be safely travelled on, so that I had to return by the usual track to Fort Carlton. On the 1st of April I reached Jack Fish Lake, where I found Mr. Sullivan, he having been obliged to leave Carlton on account of the scarcity of provisions.

At this place I had to give up the use of sleighs, as the ground was now quite bare. I had *travaux* made for my dogs after the method of the Indians, and along with Mr. Sullivan in this manner we reached Carlton on the 8th of April.

Here I found the men you had engaged at Red River, and who had only arrived the day previously. As the people at the Fort were next thing to starving, I at once despatched them to the nearest point where buffalo were to be found, so that they might hunt for themselves.

Until the 7th of May I was occupied at Carlton, when I again started for Fort Pitt to meet the men I had engaged, and whom I had directed to come to that place with the Company's annual brigade of boats. I had already sent up a supply of clothing, &c. for them.

I got to Fort Pitt on the 10th, but the unusual lowness of the river delayed the brigade, so that it did not reach that place until the 15th and 18th. I then got the horses ordered from the Company, and which were in readiness at Fort Pitt, and sent the men at once to a rendezvous to the south of the Eagle Hills, where in all probability they will meet with the party of Red River men. I did this, as it was impossible for them to be fed at Fort Pitt, as the buffalo were distant many days. Two of the party are to come on to Carlton, to guide us back, so as to avoid any chance of missing them.

On the 22nd of May I left Fort Pitt, to descend the river along with the brigade, and so complete the survey of it (which I had made during the winter, from about one day above the Mountain House) as far as Carlton. The distance, by the river, between the two places is about 235 miles, and it occupied us seven days. These boats draw only one and a half to two feet water, and are led by guides long used to navigate the river; yet from the shallowness of the water, and the great intricacy of the channel, the boats were constantly running aground, keeping the men wet from morning to night, from having to jump into the water every time to shove them off.

The river above Carlton is certainly unnavigable this season except for the smallest craft, and even then only with great difficulty.

While at Fort Pitt, waiting for the brigade, I had an opportunity of examining the cretaceous beds, and obtaining a few more of the characteristic fossils. At about ninety miles above Carlton, or about forty-five miles above the elbow of the north branch, they were observed for the last time in a section of the flank of the Eagle Hills.

From Mr. Swanston, the gentleman in charge at Fort Edmonton, I received a valuable meteorological register which he had kept, with a thermometer furnished by myself, continuously from the 1st of January till the 15th of May.

By a comparison of barometer readings at Edmonton during the months of January and February, with the similar readings at Carlton, the approximate difference of altitude between the two places is found to be 922 feet.

This meteorological register, with all other meteorological and other observations, along with the journal of this trip, will be submitted to you as soon as completed.

I have, &c.,

JAMES HECTOR, M.D.

To Captain PALLISER, Commanding North  
British American Exploring Expedition.



## No. 2.

*Read, February 14, 1859.*

Fort Carlton, Saskatchewan, June 5, 1858.

SIR,—I have the honour to report my arrival at this post on the 4th of June.

Owing to the absence of buffalo during the winter, my hunters, as well as those belonging to the Fort, have had to go to great distances in order to get meat, which they obtained in such small quantities that the Hudson Bay Company's officer in charge of this post was obliged to scatter the men with their families all over the plains in search of food. Even Dr. Hector and Mr. Sullivan were obliged to leave this post and go to Forts Pitt and Edmonton in order to lessen the consumption of meat, for which the supply here was quite inadequate; fortunately, however, the winter has been an unusually mild one, otherwise the consequences might have been very serious indeed.

I am happy to say that I have been most fortunate with regard to the horses; very few have died, and almost all the rest are in good working condition, and in far better order than when I started last year from Red River.

I am now about to start with the main branch of the Expedition to the Forks of Red Deer and Medicine Rivers, and dispatch Lieut. Blakiston with a branch expedition, viâ Forts Pitt and Edmonton, in order to carry on the magnetic determinations at those posts, as well as to bring us supplies overland in carts, ordered up in boats from Norway House last winter, to meet us at the Forks above mentioned. Lieut. Blakiston, with the supplies, will join the main branch of the Expedition, and we shall proceed to an old Fort at the foot of the Rocky Mountains not far from the boundary line, thence I shall trace the boundary line to the westward, and afterwards take a course to the northward in search of a pass practicable for horses over the Rocky Mountains within the British territory.

I purpose then to send the Expedition into winter quarters at Edmonton, and proceed with one or two men across the Rocky Mountains to meet Captain Hawkins.

I am in receipt of your last communication of the 29th of March, conveying the suggestion of the Royal Geographical Society, viz., "to deposit for Captain Hawkins's use at Fort Assineboine the records of my observations to the north of the 49th parallel." Fort Assineboine was situated on a tributary of the Mackenzie River which flows into the Arctic Ocean; the post has for several years ceased to exist, and I hope to avail myself of an easier way to communicate with Captain Hawkins, as I learn that Mr. Dallas of the Hudson Bay Company is crossing the mountains by way of

the boat encampment and Athabasca portage, and the men who return with the boats down the Columbia can take back despatches from me. I intend to adopt this means of communication in case I might subsequently fail in finding a practicable pass for horses across the Rocky Mountains within the British territory, and so fail in having a personal interview with Captain Hawkins.

I enclose letters from Lieut. Blakiston and Dr. Hector, and Mr. Sullivan, concerning their operations during the winter of 1857-58. Also M. Bourgeau's botanical report, which I shall feel obliged by your submitting to Sir William Hooker.

I have likewise the honour of enclosing the map of our explorations in 1857, containing also my route from Red River this spring.

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As soon as my men are all collected from the plains where they have been in search of food, and making provisions, I shall start the Expedition. This will probably be effected about the 12th of this month.

I would strongly recommend Her Majesty's Government at the termination of my Explorations to attach Lieut. Blakiston to Capt. Hawkins's staff, in order to continue across the Rocky Mountains his very valuable series of magnetic and meteorological observations.

I have, &c.,

JOHN PALLISER, Captain,

Commanding N.W. American Exploring Expedition.

*Her Majesty's Secretary of State  
for the Colonies.*

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### No. 3.

Read, February 14, 1859.

Fort Edmonton, Saskatchewan, October 7, 1858.

MY LORD,—I have the honour to report the safe return of myself and my secretary, Mr. Sullivan, to winter quarters; also the return of Lieut. Blakiston with the branch expedition I had sent to explore the Kutanie Pass. I have also to report the return of M. Bourgeau, whom I also sent on a botanical tour into the Rocky Mountains, with directions to follow any route where he thought he could best further the interests of botany.

I am rejoiced to say that I have completely succeeded in discovering not only a pass practicable for horses, but one which, with but little expense, could be rendered available for carts also. This pass will connect the prairies of the Saskatchewan with Her Majesty's Possessions on the west side of the Rocky Mountains. The pass is

situated precisely where I had long supposed, and this impression was communicated by me to Her Majesty's Government previous to my appointment to the command of the Expedition.

I shall now endeavour to give a summary of the movements of the Expedition, since the commencement of June, 1858, up to the present period; also of the branch expeditions of the gentlemen whom I despatched at different times for that service.

Early in the month of June, I despatched Lieut. Blakiston, by Fort Pitt and Fort Edmonton, on the north branch of the Saskatchewan River, in order to carry on the magnetic determinations at those posts, as well as to bring us supplies overland, which supplies were every day expected up in the boats. I then started with Dr. Hector, M. Bourgeau, and Mr. Sullivan, for the Eagle Hills, with the intention of exploring the region of country between the north and south branches of the Saskatchewan or Bow River. I was then accompanied only by the men I had engaged at Red River Settlement, and with them went as far as the Cross Woods, where I left them along with the gentlemen, with orders to await my return. I then started with two men and one pack-horse, and rode about 80 miles in quest of my St. Ann Brigade, whom I had sent on the prairie to the south of the Eagle Hills, in search of buffalo, the game being so scarce that I could not run the risk of keeping so large a party together. After two days' ride I found their camp; they had not only lived well, but had been able to comply with my directions, to dry meat for us, for we had started almost without provisions. I lost not an hour in leading them to join my Red River Brigade, and on the fifth day reached the Expedition at the Lizzard Lake. Here we passed our first Sunday.

All my Red River men belonged to the Church of England, consequently I read prayers for them. The St. Ann men, half breeds, although of the Catholic persuasion, asked and obtained leave from me to attend Divine worship, and I conducted the lessons and half the prayers in Cree through the medium of an interpreter. I mention this circumstance to show the respectful tendency and absence of bigotry of these men in their appreciation of Divine service.

Our supply of provisions was very small; we had meat only for three days, and about three stones of flour, for a party consisting of my three companions, myself, and 28 men. I had, however, tea and sugar remaining from last year's store, which, together with what I brought from Red River Settlement, has lasted us pretty well through the season.

The absence of all flour and vegetables did not inconvenience either us or the men in the least, and I found the tea very useful in counteracting the injurious effects of the swamp water, which otherwise might have produced many cases of dysentery.

The country surrounding the Eagle Hills and Lizzard Lake is rich, and wood abundant; but the timber is not of a valuable description, being chiefly poplar and willow. Here I learned that the war had broken out between the Cree and Blackfoot nations, and that a large number of Indians were on their way to pay me a visit. Knowing that they would have little or no provisions to trade, and fearing their importunity, I made a few forced marches and got into the Blackfoot country.

On the 22nd June we reached the 108th degree of west longitude, in lat. 52° N. The ground offering very bad pasture, was very inferior land, and we travelled the prairie without wood, depending on a scanty supply of buffalo dung, which we collected in order to cook our meals.

After passing the Ear Hills on the 24th of June, we reached the Grande Coulée, and camped near a lake three miles long and two wide, where we at length found some wood (willow and poplar, with a few birch). We were here out of provisions, but fortunately fell in with bands of buffalo. The weather was very cold and stormy, and the rain fell in torrents. We killed, however, sufficient buffalo for our present wants. Here I had the misfortune to lose one of my finest horses while cutting up a buffalo. The horse was attached to the dead bull's horn, and took fright at one of the men coming over the brow of the hill with a load of brushwood; he broke his halter and made his escape on the plain. Instantly four of my best mounted men started in pursuit; the rain poured in torrents, driven by the storm against their faces. They continued till dark night in vain; the intrepid fellows, without a coat or a blanket with them, passed the night on the broad prairie, with not a shrub to shelter them from a terrific thunderstorm, and as soon as day dawned took up the horse's tracks, mounted, and recommenced their pursuit. All their exertions, however, were in vain, for, unfortunately, the horse was a very swift, powerful animal, a finer one than any in pursuit of him.

In consequence of the severity of the weather, and the great hardships the men had undergone, one of them was seized with acute inflammation of the lungs, which delayed us for eight days. This time I could hardly consider lost, as the weather continued very wet, and the horses were much in want of rest.

We were now in the Blackfoot country, and had to guard our horses strictly every night, I myself and each of the gentlemen with me keeping watch in turn, and during the daytime keeping scouts on the "look-out" in every direction.

At length, on 3rd July, Antoine Shaw was sufficiently recovered to be removed, and the Expedition continued its course to Battle River, the weather very cold and stormy, with several severe hail

showers, the stones striking so hard as to cause pain to ourselves and the horses.

I will not occupy your Lordship's time with minute details of our journey from this, as the prairie was neither well provided with wood nor rich in pasture, but will pass on to the period of our arrival at the Battle River.

On 7th July we arrived at Battle River, a large but unnavigable tributary of the Saskatchewan, crossed the stream, and encamped in about lat.  $52^{\circ}$  N., long.  $111^{\circ}$  W. Here we found fine rich soil, well adapted for pasture and agricultural purposes. The river at this point takes a wide sweep to the south: instead therefore of continuing up the stream to the southward and then again to the northward (*i. e.*, round the bend of the river), I determined on holding my direct course, and despatched Dr. Hector with two men on horseback and one pack-horse to follow the bend of the river and meet the Expedition again, where I proposed re-crossing the stream, about 40 miles to the westward. The Doctor reached me on the 11th, the day after I arrived at my second crossing place, having laid down that portion of the river, and fully confirmed my expectations as to the fertility of the country through which it flows. Here, also, we had seen the first pines since our departure from the north branch of the Saskatchewan; and, although *now* no longer in large number, still there are indications of their having existed here in great abundance, and of a large size. Unfortunately the Indians have a most disastrous habit of setting the prairie on fire for the most trivial and worse than useless reasons. If a war party returns, if a hunting party starts, even if a single individual wishes to signal his camp, the invariable method resorted to is "firing the prairie." The result is, all their invaluable timber, such as pines and deals of every kind, perish for ever off the face of the earth, leaving nothing hereafter to spring up in their place but willows and poplars. Hence year after year willows are sacrificed for ever, which would bring wealth, warmth, and the means of transport to the future settler, who might till the soil and navigate its streams.

At our second crossing place of Battle River I was visited with great ceremony by a large camp of Circees. These Indians, though differing widely from the Blackfeet, and speaking another language, are allies to the latter. They are very poor and troublesome, and sometimes riotous and disorderly. Although the old men and chiefs were well disposed towards us, we had reason to congratulate ourselves that our party was so strong, otherwise I do not think the chiefs would have succeeded in their endeavour to keep the young men from attempts on our horses. We spent an anxious night, all keeping watch, and the next day we made them

a few presents, exchanged a few tired horses, and parted on very good terms.

Our course to the westward from Battle River continued through a soil of fine vegetable mould two feet deep upon a substratum of sand. This portion of country was no doubt formerly forest lands, but now converted into prairie by the frequent occurrence of fires which overrun the country.

On the 14th July, when nearly out of provisions, buffalo were discovered to our south at a great distance. I despatched Mr. Sullivan with the hunters, followed by three carts, to hunt, being uncertain as to whether we should again find buffalo to the westward. On the return of the carts, I gave orders to remain here a few days, to slice and dry provisions for at least ten days' consumption.

I started from this encampment in a W.N.W. direction to the Bull Lake, and left orders that the Expedition should go on their course to the Red Deer River, where I would again join them. The Bull Lake is nine miles long and seven broad, and is connected to the Red Deer River by an insignificant stream issuing from the southern extremity of the lake. I think this lake would be a desirable place for a settlement: the soil is good, and the lake is in proximity to the Red Deer River, a large navigable tributary of the south branch of the Saskatchewan. There is, however, no valuable timber at the lake itself, but ample quantity could be obtained both at the Red Deer River and its tributary, the Medicine River, where the white spruce and rough barked poplar are in abundance.

On July 24th we camped on the edge of the woods, in lat.  $51^{\circ} 52' N.$ , long.  $114^{\circ} 10' W.$  I determined there to await the arrival of Lieut. Blakiston, who was to join us after having gone by the regular cart track, *viâ* Edmonton, in charge of ammunition, flour, and a few articles for Indian presents. We waited three or four days, and with difficulty supported ourselves on deer, which were very scarce, as the Assineboines had hunted there all the spring. At length, on the 29th, I directed Dr. Hector to proceed to the forks of Medicine and Red Deer rivers, and bury a letter for Lieut. Blakiston, informing him that we were obliged to move onward from scarcity of provisions, and acquainting him how he was to steer his course in order to fall on our trail.

On July 30th we again broke up camp; and, as I intended to send a part of the Expedition by the same route to winter quarters from the Rocky Mountains, I there made a "cache" of all the articles that we could possibly dispense with, in order to lighten the Expedition as much as possible, and enable us to abandon the carts for a time, hide them, and proceed with pack-horses.

All these arrangements being completed, we started at 8-30

A.M. ; and as we were camped at 1 o'clock for dinner, Lieut. Blakiston, with his carts and horses, overtook us. He brought us the news that the boats had not arrived, and he was obliged to leave without the stores ; but he succeeded in bringing me some ammunition from Edmonton, which after all was the only thing of vital importance.

We were now without provisions, but still continued our course. In the evening, however, two of my scouts came into camp, and reported a large band of buffalo about twelve miles to S.E. The next morning we started before sunrise, and travelled till 9 o'clock, when we came within hearing distance of the tramping of the animals. Here we camped, saddled the runners, and started after our game ; we had an admirable run, and killed sixteen. All hands then went to work to prepare and dry meat for the period that we should travel among the Rocky Mountains ; because I was aware that, once we entered that range, we should have little or no chance of finding anything to eat. We all worked hard slicing and drying, made our provisions, and were ready to start on the 4th August.

As I had ample time before the close of this season to seek for the pass, the existence and place of which I was in search of, I determined to ride to the boundary line and examine the country from the mountains eastward, and took with me Mr. Sullivan. I left Dr. Hector and Lieut. Blakiston, and M. Bourgeau, to proceed to the Old Bow Fort, or Chesterfield House, with the main body of the Expedition, under charge of Dr. Hector, with orders that, as soon as they had arrived at the site of the Old Fort, he should place the carts in "cache," despatch the gentlemen on their different missions, proceed upon his own, and direct the remainder to await my secretary's return from the boundary line : M. Bourgeau to enter the mountains and proceed with three men and seven horses on a botanical exploration, wherever he thought best ; Dr. Hector with another party, to go on a geological tour ; Lieut. Blakiston to proceed through the mountains by the two known Kutanie passes, returning by the southern one.

I started at noon from our camp, known as Slaughter Camp, lat.  $51^{\circ} 20' N.$ , long.  $113^{\circ} 45' W.$ , and kept on a southern course along the prairie. We only found salt lakes ; and though we rode till 11 P.M., we camped without fire or water, but next morning reached the Lower Saskatchewan or Bow River, in lat.  $50^{\circ} 55' N.$  We crossed the river after breakfast, found it very deep, our horses as well as ourselves being obliged to swim. The country we passed over on the north side of the river has a wretched soil ; but when on the south side, the appearance and soil changed greatly for the better. We crossed numerous well-wooded rivers,—many of them containing valuable timber, such as pines, spruce, &c.,—the valleys

and neighbouring soil of which were rich and desirable for cultivation; but whenever we struck out on the broad prairie, we generally found the soil worthless, except here and there in small swamps. Although my journey to the western extremity of the boundary line was necessarily a rapid one, I determined on a visit to the "Cypress Hills." I was anxious to see this part of the country, in consequence of having heard many reports of its wonderful timber and fine rich soil. I found great tracts of splendid timber wasted by fire; there still remain, however, many valuable pines, and the land is rich, and capable of producing several grain crops in succession without manure.

On August 8th we arrived at the 49th parallel, the prairie stretching to the east, utterly devoid of wood save in the valley of the Great Belly River. The locus of 49th parallel is very strongly marked by a high prominent mountain, called the Chief Mountain, in full view of which the Indians meet in the autumn, and perform some characteristic dances. I only remained one day, which I devoted to riding in an easterly direction, and climbing elevations to obtain an extensive view of the country to the east, but saw nothing but prairie of the poorest kind, and destitute of timber. The next day I arrived late in camp, and we started for the Old Bow Fort, where we arrived on 14th August.

The site of the Old Bow Fort is in lat  $51^{\circ} 9' N.$ , long.  $115^{\circ} 4' W.$ , at the foot of the Rocky Mountains. The chimneys of the place are still standing. The Hudson Bay Company have long abandoned the post, many of their servants having lost their lives in its defence. Although the timber here, consisting of fine prusche, Banksian pine, spruce and red pine, is valuable, the soil is scanty, the river valley being occupied by immense deposits of shingle.

On my arrival at the Bow Fort I found my hunters waiting for me. They had been out in every direction, but could not fall in with buffalo; they had also found elk and deer very scarce. In addition to this, they were in great fear of the Blackfeet and Blood Indians, whose return from the south-east would soon be daily expected. I was therefore obliged to alter my plans, and desire them only to await the arrival of M. Bourgeau, and afterwards to proceed to the forks of Red Deer and Medicine Rivers, and there to await the return of Mr. Sullivan, whom I was to send in charge of my branch expedition as soon as I had searched for my pass back from the mountains, I myself proposing to proceed westward to meet Captain Hawkins and visit Vancouver. I regret, however, that a letter from Lieut. Blakiston was handed to me by one of my men, acquainting me that "his position in Her Majesty's service would not allow of his considering himself in any way connected with the Exploring Expedition under my command."

This step of Lieut. Blakiston deranged my plans a little, and is



partly the reason why I have determined on wintering on this side of the mountains.

On the 18th of August I started to seek for the new pass across the Rocky Mountains, proceeding up the north side of the south branch of the Saskatchewan or Bow River, passing the mouth of Kananaski River. Five miles higher up we crossed the Bow River and entered a ravine. We fell upon Kananaski River and travelled up it in a south-westerly direction, and the following day we reached Kananaski Prairie, known to the Indians as the place "where Kananaski was stunned, but not killed." On the 21st we passed two lakes about two miles long and one wide. We continued our course, winding through this gorge in the mountains among cliffs of a tremendous height, yet our onward progress was not impeded by obstacles of any consequence; the only difficulty we experienced was occasioned by quantities of fallen timber caused by fires. I observed that many, indeed most of these tremendous fires are caused by lightning, and in one or two places traced their progress where the foot of man could never have trod.

On the 22nd of August we reached the height of land between the waters of Kananaski River and a new river, a tributary of the Kutanie River. We remained here for the rest of the day, occupied with observations. Our height above the Bow Fort was now 1,885 feet, or above the sea 5,985 feet. Next morning we commenced our descent, and for the first time we were obliged to get off and walk, leading our horses down a precipitous slope of 960 feet over loose angular fragments of rock. This portion over, our route continued for several days through dense masses of fallen timber, destroyed by fire, where our progress was very slow, *not* owing to any difficulty of the mountains, but on account of the fallen timber, which we had first to climb over and then to chop through to enable the horses to step or jump over it. We continued at this work from daybreak till night, and even by moonlight, and at length reached the Columbia Portage on the 27th of August. Here I devoted a day to ascending some heights in search of a view of the Columbia River. After climbing several mountains in vain, I at last was astonished to find myself right upon the bank of the lake from which the Columbia rises, at a height of about 2,300 feet over the surface. Climbing a high tree in order to overlook the woods which intercepted my view, I saw both the Columbia lakes, the Columbia rising out of the southern, flowing into the northern one, out of which it bends to the westward previous to taking its northern course to the boat encampment. The most southerly of these lakes is in lat.  $50^{\circ} 7' \text{ N.}$ , long.  $115^{\circ} 50' \text{ W.}$

On the 30th of August we arrived in lat.  $49^{\circ} 36' \text{ N.}$ , long.  $115^{\circ} 37' \text{ W.}$  on the Kutanie River, where we found a camp of Kutanie

Indians. \*These are the most wretched-looking fellows I ever met ; men, women, and children, all living on berries, the men naked, and the women nearly so : yet, strange to say, although these people were starving, and destitute of clothes and ammunition, they possess a wonderful number of horses, and those very superior to the Indian horses on the east of the Mountains. Yet I had considerable difficulty in training horses for the Expedition, and those I did succeed in training were not from among their best horses, neither could I obtain more than one or two horses for mere trade, although they were most anxious to exchange horses, even greatly to their own disadvantage.

I had eleven horses with me. Most of them were in wretched condition, and many of them worn-out, unserviceable animals, yet these were eagerly exchanged and good ones given in their stead, particularly when a little present of two plugs of tobacco and fifteen balls and powder were advanced. Indeed, only for my having effected these exchanges of horses, I hardly think I should have succeeded in bringing back all the horses I had started with from the Old Bow Fort, some of which had also been with me on my previous rapid trip to the boundary line.

I learned from the Kutanies that there was a very plain, easy road to Fort Colville, distant eight days from their camp ; but as they had quarrelled with the Flat Heads, not one would volunteer to come with me as guide. However, that circumstance would not have deterred me from proceeding westward to meet Captain Hawkins and visiting Vancouver, had I known what Lieut. Blakiston's intentions were, and, indeed, it was not until after his return to Edmonton that he could communicate them to me. I merely state them without note or comment.

On September 6th I started to re-cross the mountains by the Kutanie Pass, and was surprised to find that pass also within the British territory.

We entered it in lat.  $49^{\circ} 11' N.$ , long.  $115^{\circ} 21' W.$  in the valley of the Elk River, and came out on the east side of the mountains in lat.  $49^{\circ} 32' N.$ , long.  $114^{\circ} 35' W.$  in the valley of Little Belly River. It is one frequently used, but not the general pass of the Kutanie Indians, who have a preferable one in the American territory.

On September 7th we passed the height of land, a formidable ascent, where we had to walk and lead the horses for two hours. This is the height of land which constitutes the watershed. We encamped for the night in a small prairie, after making a considerable descent. On the 8th of September our course continued through woods and swamps, for about 15 miles, till we arrived at another ascent ; this was also a severe ascent, though not so formidable as that of the day previous ; we reached its summit

about four o'clock, through a severe snowstorm, the snow falling so fast as to make me very apprehensive of losing the track. We descended that evening, and camped on the eastern side, and next day arrived at the eastern extremity of the pass. I regret that I cannot give the altitudes on this pass, as our barometer was broken by one of the horses. It is, however, far from being so favourable as the more northern one by which I entered on Kananaski River, which has but one obstacle in height of land to overcome, and where the whole line of route is free from swamps and marshes.

I will not take up your Lordship's time with an account of our journey from the Kutanie Pass to Edmonton, as I have given a description of the greater part of the country already.

I have great pleasure in reporting the arrival of Dr. Hector while I have been writing this letter. I have been very anxious about him, knowing how badly off he must have been for provisions. He has had a very severe journey, and much trouble in finding game enough to support himself and party. He has amassed a large stock of information in the mountains, geographical as well as geological. He is very anxious to penetrate farther across to the west, but unfortunately my instructions prevent me from permitting him to do so, however desirable I might consider such a journey to be. In addition to being an accomplished naturalist, Dr. Hector is the most accurate mapper of original country I have ever seen, and is now an experienced traveller. By long and severe journeys with dogs and snow shoes last winter, in connexion with his hard trip this autumn, he has laid down the whole north branch of the Saskatchewan, and the south branch from where we met it to the glaciers of its source; and there is no department of the Expedition in which he is not only competent, but willing to assist.

I have the honour of enclosing Dr. Hector's report of his explorations, and there are two facts connected with that portion of country to which I wish particularly to draw your attention.

1st.—Dr. Hector followed the Bow River right up to the main watershed of the continent, then followed it until he reached a transverse waterparting, which divides the waters of the Columbia and those of the north Saskatchewan on the one hand, from those of the Kutanie and south branch of the Saskatchewan on the other. There he found the facilities for crossing the mountains so great as to leave little doubt in his mind of the practicability of constructing even a railroad connecting the plains of the Saskatchewan with the opposite side of the main chain of the Rocky Mountains.

2nd.—Dr. Hector informs me that the water-line of the mountains is not identical with their geological axis; this axis he was unable to reach, and had only opportunity of examining what are called flanking ranges: therefore the most important geological results

relating to the Rocky Mountains of North America remain as yet unascertained, because, in conformity with my instructions, I was obliged to order Dr. Hector not to advance farther than the axis of the watershed of these mountains; and I take this opportunity of recommending Her Majesty's Government to alter that part of my instructions, and direct my movements in the following manner:—That as soon as my explorations are completed on the east side of the mountains (for now there remain  $6^{\circ}$  of longitude in the country of the boundary line), I should send Dr. Hector to complete his exploration, and then meet me at Fort Colville, whence we could return home to England by Panama, and the British West Indian mail steamer from Chagres, a far cheaper route than recrossing the whole continent of North America. Besides this, it will enable me to dispose of all my horses to great advantage, and even to make money to credit side of the Expedition in the account for horses. The Hudson Bay Company are very short of horses: they allow me 20*l.* each for 25 horses now, and have promised to purchase all the others I can spare next year. I have now 53 horses, almost all of which are sure to outlive the winter; I have lost but three or four this year, and may lose five this winter: however, I have not neglected any precaution in my power; I have cut and stacked hay for them, and am constructing a shelter for those that may require it after Christmas.

As to my expenditure this year, it is not easy to give an exact statement, as the accounts are all priced at La Chine, and I am too far distant to go down and settle them, as I did last year. They will, however, hardly exceed 2,000*l.* by more than I can counterbalance by the sale of the horses. The expenses of next season will exceed 1,500*l.* if anything at all is to be done. But if Her Majesty's Government are really apprehensive of the grant of 1,500*l.* being overdrawn, I have but one course to pursue, that of abandoning the completion of the boundary line, and all discoveries in the Rocky Mountains, and returning home in the beginning of the season. It is quite true that my expenses for this financial year will not have been so great as those for the financial year 1857-8; but any one acquainted with this expensive country will inform Her Majesty's Government that 1,500*l.* is hardly sufficient to cover a season's explorations, particularly when the salaries and home journey expenses are to be deducted from it.

I feel greatly honoured by the confidence Her Majesty's Government have hitherto placed in me; and should Her Majesty's Government consider the importance of ascertaining the practicability of a railroad across the Rocky Mountains, as well as a more extended acquaintance with the geological structure of those mountains themselves, worth the further sacrifice of a few hundred pounds, I would propose that the Government grant me the whole

of the 1,500*l.* for expenses in this country alone for the next season, independent of salaries and the homeward travelling expenses, the former of which will amount to 570*l.*, and the latter, I hardly think, will exceed an equal sum, if I am allowed to adopt the route I propose as most conducive to the interests of science as well as the purposes of economy. The only objection that can be urged to this proposition is, that Captain Hawkins and his party have been sent to the west side of the mountains. But their work, as far as I understand, will confine them to the neighbourhood of the 49th parallel, and they will not have the same facilities for accomplishing those objects as I shall, starting from the eastward in a higher latitude, where the country is safe and a small party can travel, nor could they effect them as rapidly and economically as I could.

My plan is to send Dr. Hector to pursue his discovered route, which my instructions compelled him to abandon, while I and my secretary, Mr. Sullivan, will follow a different line of traverse to the Pacific, so as to ascertain as much as possible of the nature of the country lying between the mountains and the sea north of the 51st parallel.

M. Bourgeau, who has made a magnificent collection of Alpine plants during his tour in the mountains, will return to London, *viâ* Pembina and St. Paul's, in order to fulfil his botanical engagements for 1860. I have to express my thanks to him for his most unceasing exertions, not only in his botanical labours, but for his zeal and care as manager of the provisions and stores of the Expedition, and his anxiety to assist me in every possible way.

I have also to express my satisfaction with my secretary, Mr. Sullivan, not only for his zeal and assiduity in carrying on the astronomical observations, but for his assistance and exertions for the interests of the Expedition, particularly with regard to the horses; likewise for his care and regularity with the accounts, which, in a country where everything is conducted on a system of "barter," are of a very complicated nature.

I have the honour to enclose two maps. The first contains the routes of the whole Expedition, together with those of the branch parties. The other is a rough enlargement of a portion of this, in order to display with greater clearness our different routes of exploration while in the mountains. The map is not final as regards the mountains, as Dr. Hector's longitudes are by account, and may require correction; the remainder, however, is completed, and I beg it may be preserved, as we have no time to make a copy.

We have barely returned from the plains into Fort Edmonton in time to receive and answer our letters by the "fall boats," which start again immediately after they are unloaded, to anticipate the setting of the ice. Our time, therefore, is very

short; and although I have troubled your Lordship with a long letter, yet I have been obliged to omit a great deal of information contained in the journal.

Fort Edmonton is the largest trading post in the Saskatchewan. A little agriculture is carried on; they grow tolerable wheat, and grind it in a windmill. The potatoes are excellent, and horned cattle continue out the whole winter, and still are thriving. However, I cannot observe much as yet; my whole time has been occupied with the men's accounts and the correspondence.

The Red River men return to Carlton by the boats, where I have made arrangements for their conveyance to Red River Settlement, and give them the balance of their pay in orders on the Hudson Bay Company. The Lake St. Ann men are paid in goods, as money is not known in this country, and I am now giving them value for their wages in goods ordered by me for the Expedition, charging them the Company's prices. It would be impossible to send an account down now, but I will forward one by the winter express, along with the whole corrected map of the Expedition, and the observations.

I must now beg leave to draw your Lordship's attention to that portion of my original instructions of March 31, 1857, which directs me as follows:—

“You will endeavour from the best information you can collect to ascertain whether one or more practicable passes exist over the Rocky Mountains within the British territory, and south of that known to exist between Mount Brown and Mount Hooker.”

In accordance with these instructions, I first obtained the best information I could collect, which proved so vague as to be utterly valueless. I then directed Dr. Hector to undertake the more northern search (*i.e.*, between the two branches of the Saskatchewan River); I myself, accompanied by Mr. Sullivan, undertook the search from the south branch of the Saskatchewan to the pass of the probable existence of which I had informed Her Majesty's Government before receiving the command of the Expedition. I directed Lieut. Blakiston to undertake the Kutanie Passes supposed to be in American territory. Lieut. Blakiston threw up his command in order to carry out that object independent of me; but with the assistance of Mr. Sullivan, I was also able to effect that portion of what was to have been his duty myself. This comprised the southernmost pass within the British territory. Lieut. Blakiston's exploration may perhaps have a value hereafter as a corroboration of my own.

The fact is that the knowledge the Indians possess of the mountains is very small; even among those said to “know the mountains” their knowledge is very limited indeed. This is easily accounted for by the scarcity of the game, which offers no induc-

ment to the Indians even to go there. I fear if Dr. Héctor leaves this country without completing his pass, much difficulty might arise hereafter in finding the exact point of the western exit of the valley, as it is very small, and the woods dense, and no one could find it as the Doctor himself. Besides, the most unfavourable result would even be desirable in that case, as it would set the question of the possibility of the easy construction of a railway across the Rocky Mountains for ever at rest.

I will now enumerate the several passes which have been discovered and laid down.

1st. From south branch Saskatchewan to Kutanie River :

Two, *i.e.*, Kananaski Pass and Vermilion Pass.

2nd. From Kutanie River to Columbia :

Two, *i.e.*, the Lake Pass and Beaver Foot Pass.

3rd. From south branch Saskatchewan to north branch :

One, *i.e.*, the Little Fork Pass.

4th. From south branch Saskatchewan to Columbia :

One, *i.e.*, the Kicking Horse Pass.

In addition to these discovered passes, the Northern Kutanie Pass has been laid down, and found to be entirely within the British territory, and I have named this the British Kutanie Pass.

With regard to the expressed wish of Her Majesty's Government that I should communicate with Captain Hawkins, I beg to state that I shall endeavour to find an opportunity of doing so.

In conclusion, I have to acknowledge the receipt of your Lordship's courteous expressions on the subject of my letter of 13th March, 1858. I have also to acknowledge the receipt of the abstract account for the financial year 1857-58.

I have, &c.,

JOHN PALLISER, Capt.,

Commanding N. British American Exploring Expedition.

*The Right Hon.* LORD STANLEY, *M.P.*,

&c.      &c.      &c.

Fort Edmonton, Saskatchewan, October 9, 1858.

SIR,—I have the honour to report the safe arrival of myself and party at this place on 7th current, being exactly eight weeks from the time of our separation from the remainder of the Expedition.

After your departure to the boundary line on August 3, according to your instructions I conducted the Expedition without loss of time to the site of the Old Bow Fort, and arrived there on the afternoon of the 7th. On the 5th we began to ascend considerably, and saw the last of the real plains. From this point our way lay over a succession of parallel ranges of hill, wooded in some parts to their summits, but not rising to more than 800 or 1000 feet above the plain. On the morning of the 7th we first struck the south branch of the Saskatchewan at the mouth of Dead Man River, and from this point we

followed it up until we reached the Old Fort on the same day. Its site is marked only by a group of mud and stone chimneys, the remainder of the fort having been constructed of timber, all of which has long ago been removed and used by the Indians as firewood. A small stream joins the river from the west at this place, and the main stream itself makes a bend from a north to an easterly course.

Our camp was pitched within three miles of the mountains, which rose behind as ranges of bald, inaccessible cliffs to the height of from 3,000 to 4,000 feet above the eye.

We fortunately met with a large camp of Assineboines at this place, from whom I traded pack saddles and other articles which were required for our mountain work.

In conjunction with Lieut. Blakiston, observations were made on the temperature of boiling water, to determine the altitude of the place, and to find the errors of our aneroids. The corrected mean readings for the time of our stay compared with the mean for Carlton showed the altitude above that place to be 2,225 feet, or above the sea 4,100 feet. Our aneroids, and also the sympiesometer for great altitudes, I am glad to say, still gave a very close approximation to true readings, notwithstanding the great increase of elevation.

On 11th August M. Bourgeau and I started and camped together about 11 miles up the valley of Bow River, on the banks of a lake formed by a dilatation of the river in consequence of the valley being barred by immense deposits of rounded shingle. Our road was rather a bad one, on account of the fallen timber which impeded our path, the valley not having been frequented by the Indians for many years.

This first portion of the valley cuts through five parallel ranges of mountains at right angles to their axes. These are composed of beds of crystalline and compact fossiliferous limestone (most likely of carboniferous age) dipping at 30° to w.s.w., but having several obscure plications. Two well-marked peaks occur on either side of the valley, which M. Bourgeau named "Grotto" and "Pigeon" peaks.

After passing the former of these, the following morning (having taken leave of M. Bourgeau, who remained to examine this mountain) I entered a wide trough-like valley, running to s.s.e., through which I contrived to follow up Bow River in the opposite direction for three days. This trough continues to run through the mountains, beyond the points where the river leaves and enters it, the latter being between "Cascade" and "Rundle" Mountains.

"Cascade" Mount, which is known to the Indians as the "place where the water falls," rises as a series of precipices to the height of 4,521 feet above a small level plain at its base, and is so abrupt that its summit is in view at a horizontal distance of 2,200 yards. It may be taken as a type of the mountains in this portion of the chain, all being equally precipitous and inaccessible.

Bounding the valley to the south is the "Windy" Mount of M. Bourgeau, which he has made the subject of an elaborate botanical examination.

From the Cascade Mount the river valley again changes its direction, passing at right angles to the chain so as to cross the "Saw-back" range, which are composed of the same strata as before, but now almost vertical, having only a slight inclination to w.s.w.

After following up the valley which then was reached, to n.w. for three days, on the 18th I arrived at "Castle" Mount, opposite the entrance to the "Vermilion" Pass. I had already passed three small tributaries, by following up either of which, the height of land can be crossed to the Kutanie River, but judging from Indian report, none of these were so promising as this one, by which I now resolved to cross the water-line of the mountains.

The mountains now began to wear a different aspect, more massive, and evidently much loftier. They are composed of white and pink quartzose sand-



stone, almost passing into a quartzite in some parts, and in others into a fine conglomerate. Their minute description, as well as other geological points, will, however, form the subject of a more special report.

Having devoted a day to the examination of Castle Mount, and to prepare the flesh of a moose we had killed, on the 20th I crossed Bow River, without swimming the horses and unloading their packs; and, after a six hours' march through thick woods, reached the height of land the same afternoon.

By careful barometric readings I found the rise from the river to be 539 feet; and I consider the rise of the river, to where I crossed it from the Old Bow Fort camp, to be 300 feet, thus giving for the height of land 940 feet. The small stream along which we had ascended here ends in two small lakes, the water of which is beautifully clear; and 200 yards farther on, and at 17 feet above the level of the upper lake, we came on a rapid turbid stream, flowing to the s.w., which was the head of the Vermilion River, the principal branch of the Kutanie River.

The height of land is in  $51^{\circ} 8' 30''$  N., longitude by account  $116^{\circ} 35'$  W. It is in a wide valley, between outlying shoulders of two snow-clad mountains, which I named after Mr. Ball and Colonel Lefroy, the latter being to the west. The ascent to the watershed from the Saskatchewan is hardly perceptible to the traveller, who is prepared for a tremendous climb by which to reach the dividing ridge of the Rocky Mountains, and no labour would be required, except that of hewing timber to construct an easy road for carts, by which it might be attained.

The three following days were occupied in the descent of Vermilion River, which, after flowing to s.w. by w. for nine miles, suddenly changes its course to s.e. for 18 miles, when it again changes to s., escaping into a wide valley to join a much smaller stream, which is the Kutanie River.

In its course of about 40 miles it descends 1,227 feet, so that at its junction with the main stream it is 383 feet below the Old Fort.

It becomes of considerable size a very short way from its source, as it receives large tributaries from glaciers which occupy the valleys of Mounts Lefroy, Ball, and Goodsir. The valley through which it flows is contracted only at one point, "The Gorge," near its lower part, where two lofty mountains seem to close in on the stream, without, however, in reality causing any great difficulty in passing along its base.

A road for carts down the valley of Vermilion River, from the height of land to the Kutanie River, could be cleared without difficulty; for, supposing the road to follow a straight line along the river, and the descent to be uniform, which it almost is, the incline would only be 40 feet in a mile, or 1 in 135.

The absence of any abrupt steps, either in the ascent or descent, together with the small altitude to be passed over, form very favourable points in the consideration of this pass as a line of route.

There is some confusion as to which is called the Vermilion and which the Kutanie River, in the accounts given by Indians, so I have thought it better to confine the former name to the large stream by which I descended, and consider the smaller stream into which it flows as the Kutanie River. This accords better with the nature of the valleys, as the Kutanie River, although an insignificant stream before receiving the Vermilion River, flows s.e. through a magnificent valley from three to five miles in breadth.

The forks of Kutanie and Vermilion River are in lat.  $50^{\circ} 50'$  N., long. by account  $116^{\circ} 40'$  W. (I may state that, in reference to all my longitudes, I did not trust to the reckoning by distances travelled alone, but obtained them by a system of bearings, combined with numerous observations for latitude.)

I should have liked very much to have descended the Kutanie River for some distance, to find if there is any gap in its valley by which a passage could be effected to the west without following down the stream; but my orders to

confine myself to the water-line of the mountains, and which required me to be back at Fort Edmonton early in October, limited me to a less extended circuit in the mountains than I should then have required to make; besides, judging from the absence of all tracks since leaving the valley of the south branch, there did not seem to be the slightest prospect of procuring game on the west side of the watershed, and we were now beginning to be pinched for provisions.

Ascending the Kutanie River, therefore, on the 27th, I reached the height of land which divides it from one of the principal tributaries of the Columbia River, called Beaver Foot River. The watershed is in a large morass, with several lakes occupying the bottom of a deep wide valley, common to the two streams, although flowing in opposite directions. The line of watershed is so little marked that it is impossible to cross even on foot between the two streams without going in water. On either side of it the stream is dilated into wide shallow lakes, the surfaces of which were crowded with the gaudy flower of the *Nuphar lutea*. The altitude of this watershed I considered to be 3,834 feet above the sea, or 266 feet below the Old Fort.

It is on the 51st parallel of latitude, in longitude  $117^{\circ} 10'$  w. On the north side of the valley are Mount Goodsir and Pyramid Mountain, and on the south is the Brisco range, which, although of no great elevation (about 2,000 feet above the eye), runs as an unbroken wall, to s.s.e. My Indian declared that the river we had now struck was the head of the north branch of the Saskatchewan, and wished to follow it down; but if my barometer and sympiesometer were acting with any approach to accuracy, we were now about on a level with what I had found to be the elevation of the Mountain House during last winter, so that this could not be the case. In addition, the change in the vegetation, especially the occurrence of cedar, convinced me that we were really on a branch of the Columbia.

I accordingly only followed it for two days, and on the 29th reached the mouth of a large tributary, to n.w. This river is much larger than the Vermilion River, and about four times the size of the stream into which it flows, being about equal to the south branch at the point where we left it.

Here I received a severe kick in the chest from my horse, rendering me senseless, and disabling me for some time. My recovery might have been much more tedious than it was, but for the fact that we were now starving, and I found it absolutely necessary to push on after two days.

Where it receives Beaver Foot River, Kicking Horse River bends back on itself, including an angle of only  $20^{\circ}$ , and after passing over a fine fall of about 40 feet flows on to n.w.

The mouth of Beaver Foot River is about 318 feet below the height of land where we first struck it.

As I was quite unable to move, I sent my interpreter, Peter Erasmus, to ascend Mount Hunter, which is included in the angle of Kicking Horse River. He ascended for 3,496 feet, and obtained a view, to the west, of snow-clad peaks as far as the eye can reach. Over the tops of Brisco's range, and all to the left of s.w., he could perceive no mountains; so that if that portion of country is occupied by any, they must be of very inferior altitude.

It was my intention to have crossed Brisco range on foot, but my unfortunate accident quite unfitted me for the task.

The angle of Kicking Horse River is in lat.  $51^{\circ} 10'$  n., long.  $117^{\circ} 26'$  w.

While traversing this valley, since coming on the Kutanie River, we have had no trail to follow, and it did not seem to have been frequented by Indians for many years. This makes the absence of game all the more extraordinary. The only animal which seemed to occur at all was the panther. The Indian saw one, and in the evenings we heard them calling, as they skirted round our camp, attracted by the scent.

The bottom of the valley is occupied by so much morass, that we were obliged to keep along the slope, although the fallen timber rendered it very tedious work, and severe for our poor horses, that now had their legs covered by cuts and bruises.

The timber along Beaver Foot River is mostly young, but there are the remains of what had been a noble growth of forests, consisting of cedar, pines, and spruce, among the latter of which is the magnificent prusche, which sometimes reaches four yards in circumference. I also saw a few young maples (*Negundo fraso*). Berries of many kinds were very abundant; and, indeed, had it not been for these, we should have suffered much from hunger.

On 31st August we struck up the valley of Kicking Horse River, travelling as fast as we could get our jaded horses to go, and as I could bear the motion, and on the 2nd Sept. reached the height of land. In doing so we ascended 2,021 feet. Unlike the Vermilion River, the Kicking Horse River, although rapid, descends more by a succession of falls than by a gradual slope. Just before we attained the height of land, we ascended more than 1,000 feet in about a mile, down which the stream leaps by a succession of cascades.

This height of land is 5,120 feet above the sea, and is in lat.  $51^{\circ} 24' N.$ , long.  $117^{\circ} 20' W.$  The waterline is in a flat valley, clothed with fine open forests of spruce, lying between Mount Vaux and the eastern end of the Waputteck Mountains.

Here, to our great joy, we found tracks of game again.

On the morning of the 3rd we followed down a small stream over a wooded plain for about six miles, and only descended about 50 feet from the height of land, when we came to a large river, flowing to S.E., which the Indian at once recognized as the south branch, from which we had been absent about two weeks.

The same afternoon he killed a moose, which relieved us from want, and we also fell in with a band of Assineboines, who had just come over by a direct pass from the north branch to this place.

We had several days of severe weather at this time; a great deal of snow with thunderstorms. I delayed here with the Indians on account of our horses requiring rest, and also to get them to dry our moose-meat properly for us, as we lost more than half of the last from its not being well prepared.

On 8th September I started to ascend the south branch, not following the pass by which the Indians had come, and which they described as very easy, but to endeavour to pass from its head waters to those of the west branch.

All the mountains on both sides of us were now snow-clad; those on the south side having their valleys occupied by glaciers, some of great size.

In two days we reached the height of land by a gradual ascent. Here the south branch issues from a lake about four miles long, the upper end of which is fed by a glacier which descends from a magnificent *mer de glace*, occupying the elevated valleys of Mount Balfour. There is a small stream, however, which flows into this lake from a fine plain which forms the upper of the valley. Following up this, we come to where it rises from a group of springs, and a few yards farther on, a second group gives rise to the waters of the north branch. We dined at this watershed, which is the highest point we passed over with the loaded horses, being 6,347 feet above the sea. Snow was lying under the shade of the trees, notwithstanding the clear midday sun. Lat.  $51^{\circ} 40' N.$ , long.  $117^{\circ} 30' W.$

The first part of the descent from this height of land was a great contrast to our ascent of the south branch to reach it; for, in the course of two miles, we had descended about 1,000 feet. Four miles from the height of land, the small stream which originates there receives a large branch from S.E., which rises in a glacier, descending from the same *mer de glace* as that which feeds the lake at the head of the south branch. This feeder of the north branch I called

the Little Fork: it flows to n.w. through a rugged valley between Mount Murchison and Mount Balfour. The former of these, which is a most massive mountain, the Indians consider to be the highest of all the Rocky Mountains.

I afterwards measured two of its highest peaks, the one above the angle of the main river and the little fork, the other to the south of the Kutanie plain, on the main river. They are, respectively, 15,789 and 14,431 feet above the sea. I hope I may have yet an opportunity of visiting Mount Brown and Mount Hooker, so as to obtain their altitudes relatively to Mount Murchison. The great size of these mountains, some of which are formed of groups 60 to 80 miles in circumference, prevents the proper appreciation of their altitude; besides, not only here, but all through that portion of the range I have seen, there is an absence of striking peaks.

From the point where I met the north branch, I ascended to the place known to the Indians as the "Ice," and from which the largest fork of the north branch rises. The river is large at this place, and flows through a very wide valley, winding through shingle beds which must be covered by every spring flood, as they are clothed by a matting of *Dryas integrifolium*, *Epilobium alpinum*, and other Alpine plants, the seeds of which have been carried down from their natural habitats by the mountain torrents.

It occupied two days to ascend to the foot of the great glacier; but one of these was occupied in cutting a road through fallen timber along the banks of the Glacier Lake. This lake is about seven or eight miles long, and about four wide, and is formed by the damming up of a narrow valley between Mount Forbes and Mount Lyell.

The upper part of this valley is occupied by glaciers communicating with immense fields of ice which cover the mountains all round it. The foot of the glacier is about 4,320 feet above the sea. It is easy of ascent, as it terminates by a rounded slope, to reach which, from the floor of the valley, I had only to scramble over the series of moraines which lie in front of it. That portion lying within the valley is about five miles long and three wide; it is 600 feet deep at its lower part, but its surface at the upper end is 1,560 above the valley at its base. It is fed by a narrow spout-like glacier from the *mer de glace* above. I ascended Sullivan Peak to the north of it, having an altitude of 7,858 feet, and obtained a splendid view of the immense mass of ice which envelopes the mountains to the south and west, obliterating all their valleys.

The stream which issues from the Glacier Lake is much larger than either the main fork or the little fork. The former of these two I ascended for some distance, and saw that it took its rise in the glaciers of a mountain to s.s.e. Up this river there is said to be a pass direct to the Columbia, which was the one first used by trappers in the time of the North-West Company, as far as I could make out from the accounts of the Indians. Mount Forbes, which lies between the Glacier Lake and the great fork of the north branch, I found to have an altitude of 13,400 feet.

Descending the valley of the north branch as it sweeps round the base of Mount Murchison, on the 16th I reached the Kutanie plain, where the valley becomes much expanded, and is occupied by fine level plain, free from wood, like true prairie. This spot is famous among the Indians for the abundance of game, but it had been well hunted during the summer, so that there was now none left. Buffalo at one time were very numerous here, and their bones and dung showed that this must have been not many years ago. I remained here a few days to examine the mountains which overlook the valley. One to the west of the plain I ascended, and found to be 8,913 feet above the sea. On the east side of the valley is what I consider to be the continuation of the Saw-back range, so that the Kutanie plain lies in the same trough-like valley of the mountains as that in which Castle Mountain stands, and which is continuous to the north-east of Mounts Richardson and Murchison.

While resting here the Indian shot some of the big horns, the meat of which,

when fat, is certainly the finest of all animals in the country. They occur only along the outer range of the mountains. The rams alone frequent the high portions of them, and the ewes keep by the river margins, especially where craggy. The true animal of the mountains is the white goat, which always keeps at high altitudes, and is only met with toward the axis of the chain. It never descends into the valleys, summer or winter, except at certain places, to eat a kind of white clay, which occurs among the recent deposits in the valleys of the mountains.

The valley of the north branch cuts through the mountains more directly than that of the south branch, and is accordingly much shorter.

Throughout it is very much wider than the valley of any other river I have seen in the mountains, and it is skirted by terrace levels consisting of deposits of shingle, white calcareous clay, and sand, the whole way up to the great fork. Its descent is not great, amounting only to 300 feet from the glacier lake to where it issues from the mountains. Having passed a large tributary from the north, which I named Waputteehek or "White Goat" River, I passed out of the mountains on the afternoon of the 18th, after having been 38 days travelling in them. The following day we arrived at Big Horn River, where I determined to give my horses a week's rest, as they were so reduced as to be quite unfit for the long trip which still remained before reaching Edmonton. The feeding along this tributary of the Saskatchewan which enters it between the main chain and Brazeau range is exceedingly fine, consisting almost entirely of vetches. Besides, I wished to get a series of observations for chronometer rate, so as to determine, if possible, the exact longitude of this place, and by comparing that with the longitude of Bow Fort, obtain the direction of this portion of the chain, as the two places occupy similar positions with reference to it. The latitude of the point where the north branch leaves the mountains is  $52^{\circ} 20' N$ . The longitude I have not yet ascertained, but by account  $117^{\circ} W$ .

While resting at this place, the Indian killed several ewes of the big horn, the flesh of which we dried to serve as provision to take us to Edmonton. Here we were met by a band of Assineboines, who came and camped beside us, and from whom I obtained a fresh horse for one that was too much reduced to proceed farther. The weather was again very unsettled at this time, and several inches of snow fell, which continued to lie on the mountains. We started for the Rocky Mountain House on the 27th, and, leaving the north branch to the south, passed through a nick in Brazeau range. This range is formed of limestone beds tilted up at an angle of  $30^{\circ}$  to  $W$ . They are wooded to their summits on the west side, and rise to about 2,000 feet above the valley.

Having again met the north branch, we followed it down through thick forests, till, on the night of the 31st, we reached the Mountain Fort in lat.  $51^{\circ} 28' N$ , long.  $115^{\circ} 7' W$ . The fort is deserted all summer, being only a winter post for the Blackfeet. The traders had not yet arrived, so we found it looking very desolate, with the courtyards choked with weeds, and all the windows and doors were standing open. We took possession of it for the two nights we were at this place, but did not find it so comfortable as our camp fire.

On 2nd October I left the Mountain House for Edmonton, following the road I had travelled between the two places last winter. We were again out of provisions; but as we were now travelling among poplars, we had no difficulty in supporting ourselves on rabbits.

A severe snow storm, which covered the ground to the depth of 18 inches, quite fatigued our horses, so that we had to load our riding horses; and in this manner only with difficulty reached this place on the 7th.

I remain, &c.,

Capt. JOHN PALLISER, &c. &c.

JAMES HECTOR, M.D.

OBSERVATIONS for LATITUDE made by Dr. HECTOR when detached from the Expedition.

Date.	Place.	Obs. Mer. Alt. corrected for I.E.	Longitude by Account.	Latitude.
1857.		o ' "	W. " "	N. " "
Dec. 14	Four miles E. of Redberry Lake . . .	* Polaris 108 20 0	106 56 0	52 42 0
" 19	English Creek . . . . .	⊙ 25 13 0	108 56 0	53 16 0
" 19	E. angle of Red Deer Hill . . . . .	* Polaris 110 53 0	109 3 0	53 28 0
" 20	Fort Pitt . . . . .	* " 110 4 30	109 18 0	53 35 0
" 20	" . . . . .	* Jupiter 97 46 0	"	53 34 0
" 22	" . . . . .	⊙ 26 32 0	"	53 34 0
1858.				
Mar. 29	Fort Pitt . . . . .	⊙ 79 20 30	"	53 34 0
Jan. 5	Fort Edmonton . . . . .	⊙ 28 26 0	113 49 0	53 29 0
" 5	" . . . . .	* Polaris 109 50 0	"	53 30 0
" 8	" . . . . .	⊙ 28 0 0	"	53 32 0
Feb. 10	" . . . . .	⊙ 44 2 0	"	53 30 0
" 11	" . . . . .	⊙ 44 42 0	"	53 30 0
" 20	" . . . . .	⊙ 50 51 30	"	53 31 0
Mar. 4	" . . . . .	⊙ 59 51 0	"	53 31 0
" 6	" . . . . .	⊙ 61 26 30	"	53 30 0
" 7	" . . . . .	⊙ 62 9 30	"	53 31 0
Jan. 11	Crossing Place, Battle River, on Moun- tain Ho. Track . . . . .	* Jupiter 99 34 0	114 6 0	52 41 0
" 14	Rocky Mountain Fort. . . . .	* Polaris 107 53 0	115 30 0	52 29 0
July 9	Elbow of Battle River . . . . .	⊙ 119 37 0	111 5 0	52 19 0
Aug. 12	Rocky Mountains, Bow River, First Lakes . . . . .	⊙ 107 19 30	115 16 0	51 1 44
" 14	Rocky Mountains, Bow River, The Nick . . . . .	⊙ 105 59 0	115 30 0	51 2 26
" 15	Rocky Mountains, Bow River, Cascade Mount . . . . .	⊙ 105 10 0	115 40 0	51 9 18
" 18	Rocky Mountains, Bow River, Castle Mount . . . . .	⊙ 103 10 0	116 0 0	51 10 42
" 21	Rocky Mountains, Vermilion River, The Angle . . . . .	⊙ 101 20 0	116 26 0	51 6 0
" 22	Rocky Mountains, Vermilion River, Suow Creek, S. from Mount Ball . . . . .	⊙ 100 49 0	116 19 0	51 2 45
" 24	Rocky Mountains, Kutanie River, N. of Forks . . . . .	⊙ 99 48 0	116 26 0	50 52 0
" 26	Rocky Mountains, Kutanie River, its source . . . . .	⊙ 98 11 0	116 40 0	51 0 37
" 28	Rocky Mountains, Beaver Foot River . . . . .	⊙ 96 28 30	116 52 0	51 9 30
" 30	Rocky Mountains, Kicking Horse River Falls . . . . .	⊙ 95 0 0	116 55 0	51 10 0
Sept. 1	Rocky Mountains, Kicking Horse River Falls . . . . .	⊙ 93 18 0	116 57 0	51 16 30
" 3	Rocky Mountains, Bow River, Noore Creek . . . . .	⊙ 91 38 0	116 38 0	51 22 40
" 8	Rocky Mountains, Bow River, Noore Creek . . . . .	⊙ 87 44 0	116 43 0	51 28 0
" 9	Rocky Mountains, Bow River, its source . . . . .	⊙ 86 34 0	117 0 0	51 40 0
" 11	Rocky Mountains, N.B. Saskatchewan, E. end of Glacier Lake . . . . .	⊙ 86 36 0	117 30 0	51 54 0
" 12	Rocky Mountains, N.B. Saskatchewan, W. end of Glacier Lake . . . . .	⊙ 83 54 0	117 39 0	51 52 16
" 14	Rocky Mountains, N.B. Saskatchewan, 4 miles above mouth of Little Fork . . . . .	⊙ 82 16 0	117 22 0	51 56 30
" 18	Rocky Mountains, N.B. Saskatchewan, 4 miles below Wapattuk River . . . . .	⊙ 78 45 30	116 46 0	52 18 0
" 20	Rocky Mountains, N.B. Saskatchewan, Sheep River . . . . .	⊙ 76 41 0	116 40 0	52 24 0
" 23	Rocky Mountains, N.B. Saskatchewan, Sheep River . . . . .	⊙ 74 21 0	"	52 23 30
" 28	Saskatchewan River, N.B. Miry Creek . . . . .	⊙ 70 14 0	116 10 0	52 30 0
" 29	N. branch Saskatchewan . . . . .	⊙ 69 35 30	116 0 0	52 26 0
Oct. 1	S.E. of Mountain, in woods . . . . .	⊙ 67 20 30	115 25 0	52 23 30
" 5	Bad Bearer Dam . . . . .	⊙ 42 50 30	113 58 0	53 5 0
Nov. 29	Battle River, Bear Hill . . . . .	⊙ 30 55 0	113 55 0	52 46 26
Dec. 1	Red Deer River, mouth of Blind River . . . . .	⊙ 31 10 0	114 0 0	52 18 13
" 2	" 10 miles above last . . . . .	⊙ 31 6 0	114 10 0	52 12 36
" 4	Red Deer River, 5 miles above Medicine River . . . . .	⊙ 30 55 0	114 20 0	52 1 26
" 6	Red Deer River, 20 miles above last . . . . .	⊙ 30 47 0	114 40 0	51 50 28
" 9	Little Red Deer River . . . . .	⊙ 30 52 0	114 45 0	51 29 24
" 10	" source of . . . . .	⊙ 30 55 0	114 50 0	51 21 40
" 15	Edge of Plain, Stony Camp . . . . .	⊙ 30 7 0	114 45 0	51 25 24

## RECORD of ASTRONOMICAL OBSERVATIONS during Seasons 1857-58.

*Longitudes obtained by Observation.*

Locality.	Latitude by Observation or by Account.			Approximate M. T. P.				Mean of Chronometer Times corrected for E. on G.M.T.				Mean of Observation Altitudes, corrected for.			Longitude.		
	°	N.	"	1857.				D.	H.	M.	S.	°	′	"	°	W.	"
Fort William, H.B.C.	48	24	5	June 13,	8 A.M.	13	1	43	39	68	44	7	89	24	50		
Trembling Portage	48	30	0	"	21, 9 A.M.	21	2	47	35	88	45	41	89	58	48		
Dog Portage (W. end)	48	45	0	"	22, 9 A.M.	22	2	31	59	83	39	51	89	53	45		
Dog River (r. bank)	48	55	0	"	23, 8 A.M.	23	2	16	59	78	30	39	89	53	48		
Savannah Portage	48	53	0	"	25, 8 A.M.	25	2	7	17	74	43	35	90	13	46		
Barrier Portage	48	45	0	"	26, 5 P.M.	26	10	34	15	64	2	23	90	50	24		
French Portage	48	40	0	"	27, 10 A.M.	27	4	4	35	109	19	37	91	11	32		
Camp Portage	48	25	0	"	29, 7 P.M.	29	13	24	48	53	18	20	92	27	28		
	48	27	0	"	30, 7 A.M.	30	1	13	58	53	12	49	92	30	4		
Fort Frances, H.B.C.	48	36	15	July 1,	6 P.M.	1	11	55	3	40	39	27	93	33	34		
Rainy River	48	50	0	"	3, 9 A.M.	3	3	43	35	93	13	31	94	14	19		
Portage de Bols	49	26	0	"	4, 9 A.M.	4	2	42	42	75	36	39	94	48	7		
Winipeg River	49	55	0	"	5, 8 A.M.	5	3	2	4	84	34	31	94	45	30		
Ditto	50	15	0	"	6, 8 A.M.	6	2	55	52	81	31	54	95	17	19		
* Winipeg Lake	50	33	48	"	*	*	*	*	*	*	*	*	96	33	56		
Ditto	50	23	0	"	11, 5 A.M.	11	2	35	26	72	21	2	96	30	25		
Upper Fort Garry	49	52	6	"	16, 8 A.M.	16	2	47	47	74	49	20	96	52	27		
Post on boundary line, near																	
Pembina	48	59	12	"	25, 3 P.M.	25	10	15	1	73	43	58	96	46	13		
Prairie	48	52	0	"	28, 3 P.M.	28	10	39	34	65	34	4	97	17	29		
Ditto	49	10	0	"	31, 4 P.M.	31	11	5	27	56	51	56	98	10	39		
Ditto	49	8	0	Aug. 2,	4 P.M.	2	10	3	51	76	23	2	98	33	45		
Ditto	49	8	0	"	3, 5 P.M.	3	11	6	37	56	18	32	98	47	15		
Ditto	49	8	0	"	4, 8 A.M.	4	1	43	38	45	42	32	98	43	24		
Ditto	49	0	32	"	5, 4 P.M.	4	10	31	20	67	37	43	99	1	25		
Turtle Mount, E. Flk	49	0	0	"	5, 5 P.M.	5	11	46	16	43	6	52	99	16	50		
Ditto	49	6	0	"	7, 5 P.M.	7	11	21	48	50	23	27	99	21	43		
Qu'Appelle Lakes, 12 miles S. of	50	20	0	Sept. 13,	3 P.M.	13	10	26	33	49	31	28	103	45	45		
Saskatchewan, S. branch of	50	22	48	"	27, 3 P.M.	27	11	32	31	25	19	17	107	41	7		
Red Deer Lakes, 6 miles N. of	51	20	0	Oct. 3,	9 A.M.	3	3	43	15	20	27	9	107	32	15		
Prairie	51	41	0	"	4, 9 A.M.	4	4	44	59	26	43	30	107	37	51		
Ditto	52	5	0	"	5, 2 P.M.	5	9	28	40	24	18	40	107	21	0		
Ditto	52	12	0	"	6, 2 P.M.	6	9	43	4	22	11	31	106	51	0		
1858.																	
Eagle Hills	52	18	0	June 21,	7 A.M.	21	2	9	22	26	52	32	107	28	15		
Ditto, 3 miles S. of Lizard Lake	"	"	"	"	21, 4 P.M.	21	11	30	33.5	33	23	19	107	28	16		
Eagle Hills, at Stony Lake	52	14	0	"	22, 3 P.M.	22	9	46	39	43	40	29	107	35	4		
Prairie	52	14	0	"	24, 9 A.M.	23	3	15	19.4	42	22	11	108	11	33		
Ditto	52	16	0	"	24, 7 A.M.	24	2	8	16.4	25	39	17	108	27	27		
Ditto	52	21	0	"	25, 7 A.M.	25	2	30	14.6	29	7	5	108	44	25		
Winnipeg, Valley of	52	28	39	"	26, 8 A.M.	26	3	49	47	40	54	2	108	51	39		
Ditto ditto	52	28	39	"	27, 8 A.M.	27	3	50	43	41	1	6	108	52	36		
Prairie	52	30	0	July 2,	4 P.M.	2	11	20	15	35	53	22	109	2	30		
α Ditto	52	34	25	"	4, 8 A.M.	4	3	28	5	36	46	25	109	23	45		
Ditto	52	36	0	"	8, 7 A.M.	9	2	32	13.5	27	27	4	110	23	45		
Battle River, 1st crossing of	52	35	39	"	7, 9 A.M.	7	4	12	44.7	42	9	5	110	30	7		
Ditto 2nd crossing of	52	28	23	"	10, 7 A.M.	10	2	55	48.6	30	4	31	111	29	45		
α Dried Mount Camp	52	24	29	"	14, 4 P.M.	14	11	47	15.6	32	59	22	112	14	35		

\* This observation was accidentally cleaned from slate, leaving, however, the result as tabulated.

α Indicates lunar distances observed.

N.B. Frequent examinations of chronometer rate, since the date of the last tabulated longitude, showed us that the rate was unsteady. All longitudes that are determined since that, are the results of lunar distances.

The longitude of Carlton is the result of the accompanying distances, observed while we remained there.

RECORD OF ASTRONOMICAL OBSERVATIONS, &c.—*continued.**Latitudes by Observation.*

Locality.	Date.	Observed Mean Altitude, Corrected for Index Error.			Longitude by Observation or by Account.			Latitude.		
	1857.	°	'	"	°	'	"	°	'	"
Fort William, H.B.C.	June 13	129	11	16	89	24	50	48	24	5
Dog Lake (S. shore)	" 12	128	51	27	89	45	0	48	46	11
Prairie Portage	" 24	128	27	37	89	45	0	48	56	16
Fort Frances, H.B.C.	July 1	128	28	41	93	33	33	48	36	15
La Plume River	" 2	128	29	21	93	50	0	43	47	18
Lac de Bois	" 4	126	4	53	94	48	0	49	33	45
Winnipeg River	" 6	124	6	1	95	20	0	50	21	38
Lake Winnipeg	" 10	122	45	51	96	33	56	50	33	46
Upper Fort Garry	" 16	123	19	28	96	52	27	49	52	6
Prairie	" 22	120	56	52	97	0	0	49	28	43
Post on Boundary Line near Pembina	" 25	120	40	22	96	46	13	48	59	12
Prairie	Aug. 1	117	4	14	97	56	0	49	6	53
Ditto	" 2	116	33	54	98	20	0	49	7	47
Ditto	" 4	115	36	50	98	50	0	49	4	40
Turtle Mount, E. Falkland	" 5	113	12	27	99	16	50	49	0	32
Ditto	" 7	113	54	47	99	21	43	49	6	2
Prairie	" 12	109	59	37	100	5	0	49	36	3
Ditto	" 14	107	49	17	101	10	0	50	4	20
α Fort Ellice, H.B.C.	" 17	105	15	0	101	48	0	50	24	32
Ditto	" 21	102	37	40	101	48	0	50	24	24
Prairie	Sept. 11	87	28	35	102	10	0	50	23	40
Ditto	" 18	81	58	55	106	0	0	50	26	26
Ditto	" 19	81	9	45	106	50	0	50	27	59
Ditto	" 20	79	50	55	107	10	0	50	44	45
α Saskatchewan, Elbow of S. Branch	" 22	77	42	7	107	37	30	51	1	24
Saskatchewan, S. Branch of	" 27	74	5	7	107	41	7	50	52	48
Red Deer Lakes, 6 miles N. of	Oct. 3	68	23	47	107	32	0	51	23	45
Prairie	" 4	68	54	27	107	32	0	51	45	16
Ditto	" 5	65	32	27	107	0	0	52	3	7
Ditto	" 7	63	3	27	106	30	0	52	31	40
Jack Fish Lake	" 23	50	56	37	108	10	0	53	2	6
	1858.									
Eagle Hills	June 21	121	48	35	107	28	15	52	17	59
Prairie	" 23	121	53	35	108	11	33	52	14	37
Wiquatinow, Valley of	" 26	121	16	45	108	52	10	52	28	39
α Sand Hills	July 4	120	5	20	109	22	0	52	34	25
Battle River, 1st crossing of	" 8	119	14	30	110	50	7	52	35	39
Ditto 2nd ditto	" 10	118	59	45	111	29	45	52	28	23
α * Dried Meat Camp	" 14	118	0	5	112	18	45	52	24	29
Hull Lake, 3 miles S.E. of	" 18	116	42	55	112	34	0	52	23	24
Dead Man's Creek	" 20	116	6	45	113	3	0	52	19	25
Nick Hills	" 23	115	8	45	113	40	0	52	12	52
Camp	" 24	115	18	0	114	0	0	51	55	43
α * C��che Camp, Edge of the Woods	" 26	114	31	40	114	10	15	51	52	52
Prairie	Aug. 1	112	47	55	113	55	0	51	19	12
α Slaughter Camp	" 2	112	14	5	113	50	0	51	20	47
Bow River, 1st crossing of	" 4	112	3	55	113	50	0	50	54	46
Most N. Tributary of Belly River, 1st crossing of	" 6	112	34	30	113	45	0	50	6	23
Tributary of Belly River, 1st crossing of	" 7	113	9	5	113	53	0	49	32	31
Chief's Mountain, 6 miles N. of	" 8	113	29	35	113	50	0	49	5	6
Tributary of Belly River, 2nd crossing	" 10	111	22	25	113	58	0	49	33	50
* Woods	" 13	106	56	25	114	20	0	50	52	49
α * Old Bow Fort, Site of	" 15	105	10	20	115	4	30	51	8	46
Kanana-ki Pass in Rocky Mountains	" 19	103	5	15	115	12	0	50	54	17
Ditto	" 20	102	44	25	115	12	0	50	45	3
Ditto	" 21	102	20	35	115	21	0	50	37	1
Ditto	" 22	101	38	45	115	21	0	50	37	49
Ditto	" 23	100	55	55	115	27	0	50	38	55



RECORD of ASTRONOMICAL OBSERVATIONS, &c.—*continued.**Latitudes—continued.*

Locality.	Date.	Observed Mean Altitude, Corrected for Index Error.			Longitude by Observation or by Account.			Latitude.		
		1858.			W.			N.		
		°	'	"	°	'	"	°	'	"
Tributary of Kutanie River . . . . .	Aug. 24	100	32	15	115	30	0	50	30	14
Forks, Kutanie River . . . . .	" 26	99	14	50	115	43	0	50	27	21
Kutanie River . . . . .	" 27	98	48	40	115	40	0	50	19	24
Ditto . . . . .	" 28	98	24	40	115	42	45	50	10	13
Ditto . . . . .	" 29	98	0	0	115	33	0	50	1	14
Tobacco Plain, commencement of . . . . .	" 30	96	54	25	115	33	0	49	42	41
α Stray Camp . . . . .	Sept. 2	95	12	55	115	27	0	49	58	15
British Kutanie Pass, W. end of . . . . .	" 6	93	49	5	115	22	0	49	11	21
Ditto ditto Height of Land . . . . .	" 7	92	47	25	114	58	0	49	19	44
Ditto ditto E. end of . . . . .	" 9	90	52	15	114	30	0	49	32	3
Middle Tributary of Belly River, coming from Crow Lodge . . . . .	" 10	89	44	25	114	25	0	49	47	0
Most N. Tributary of Belly River, 2nd cross- ing of . . . . .	" 11	88	0	40	114	21	0	50	12	16
High Wood River, 4 miles N. of . . . . .	" 12	86	28	30	114	18	0	50	35	29
Bow River, 7 miles S. of . . . . .	" 13	84	59	0	114	10	0	50	57	16
*Red Deer River . . . . .	"	Obs. of Polaris			114	13	0	52	4	45
Battle River, 3rd crossing of . . . . .	" 18	77	42	25	114	0	0	52	39	44
α *Fort Edmonton . . . . .	" 22	72	52	40				53	31	43
Ditto . . . . .	" 24	71	18	41				53	31	44
Ditto . . . . .		Red. to Mer.						53	32	11
Ditto . . . . .		Red. to Mer.						53	31	59
Ditto . . . . .		Mer. Alt. of Moon.						53	32	13

\* Indicates Latitude obtained by other methods.

α , , Lunar Distances observed.

N.B.—The Longitude of Edmonton is omitted, as a series of Lunar Distances are being taken for that purpose.

## RECORD of ASTRONOMICAL OBSERVATIONS.

*For Variation of the Compass.*

Latitude.		Longitude.		Mean of Chronometer Times.				Error on G.M.T.	Mean of Observed Altitudes.	I. E.	Mean of Observed Bearings.	Var.			
°	N. "	°	W. "	D.	H.	M.	S.		°	'	"	°	'	"	E.
48	30	0	89	58	48	June	21	3	6	55	2	40	6	2	1
48	45	0	89	53	45		22	2	18	42	2	43	8	54	2
48	40	0	89	58	0		21	8	50	46	2	40	5	14	3
48	55	0	89	53	48		23	2	20	53	2	45	9	5	4
48	53	0	90	13	46		25	2	0	45	2	49	6	53	5
48	45	0	90	50	24		26	10	23	45	2	52	3	31	6
48	35	0	91	12	0		27	12	17	22	2	54	8	14	7
48	25	0	92	27	28		29	13	39	25	3	5	6	46	8
48	27	0	92	33	0		30	1	16	56	3	8.5	9	53	9
48	36	0	93	33	33	July	1	4	19	9.6	3	9.5	9	31	10
48	50	0	93	58	0		3	3	34	32	3	12	10	1	11
48	26	0	94	48	0		4	3	20	9	3	15	8	6	12
49	55	0	94	45	30		5	5	8	50	3	17	12	1	13
50	15	0	95	17	19		6	3	2	30	3	19	29	15	14
50	33	0	96	33	56		10	10	9	3	3	28	74	26	15
50	23	0	96	30	0		11	2	28	54	3	30	73	33	16
49	18	0	96	40	0		23	2	11	39	13	0	65	35	17
49	5	0	96	50	0		23	7	40	0	13	5	°s sett. amp.	—	18
49	0	0	96	42	28		25	10	17	42	14	1	°s	+5	2
48	52	0	97	13	44		28	10	27	16	14	46	61	17	33
48	50	0	97	29	48		29	11	14	8	15	1	49	6	46
48	42	0	97	24	0		30	9	48	12	15	6	76	23	6
49	10	0	98	6	39		31	11	0	7	15	20	53	20	36
49	8	0	98	30	4	Aug.	2	9	57	56	15	44	73	7	50
49	8	0	98	43	30		3	10	59	28	15	59	53	9	5
49	8	0	98	44	39		4	1	37	52	16	14	49	13	58
49	0	32	98	57	40		5	11	40	12	16	35	84	5	10
49	0	32	98	57	40		5	11	40	12	16	50	39	20	56
49	0	0	99	13	0		6	2	56	8	16	59	73	16	52
49	6	0	99	18	0		7	11	12	9	17	5	47	51	4
49	8	0	100	0	0		9	9	46	33	17	34	85	34	10
Ditto.	Ditto.						9	9	26	0	..	..	°s sett. amp.	—	4
50	4	20	100	30	0		14	9	10	31	17	49	84	43	46
50	24	32	101	48	0		20	11	5	56	..	..	48	39	4
Ditto.	Ditto.						21	6	10	51	..	..	101	38	0
Ditto.	Ditto.						21	10	45	19	..	..	53	34	56
50	22	0	103	30	0	Sept.	8	9	20	25	..	..	33	0	15
51	1	24	107	37	30		22	10	29	29	..	..	47	13	34
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## RESULT of LUNAR OBSERVATIONS.

Date.	Place.	Latitude.	Longitude by Lunars.			
		° N. "	° W. "	° W. "		
Dec. 22, 1857	Fort Carlton . . . . .	52 52 39	106 8 30	} Mean 106 15 18		
May 19 "	Ditto . . . . .	Ditto.	106 21 45			
" 20 "	Ditto . . . . .	Ditto	106 15 39			
Sept. 22 "	Elbow, S. branch of Saskatchewan River . . . . .	51 1 26	107 37 30			
Aug. 15, 1858	Old Bow Fort, site of at base of Rocky Mountains . . . . .	51 9 0	115 8 0	} Mean 115 4 22		
" 16 "	Ditto . . . . .	Ditto	115 0 45			

## No. 4.

Fort Edmonton, Saskatchewan, January 10, 1859.

MY LORD,—I avail myself of the opportunity afforded by the Hudson-Bay Company's Winter Express to send a few lines to your Lordship, although I have nothing of any importance to communicate, owing to the advance of the winter season having put a stop for the present to the farther progress of the Expedition.

Shortly after our arrival at winter quarters here, Dr. Hector started as soon as the snow was sufficiently deep for sleighing, to ascend the Red Deer River, with the object of examining the remainder of a portion of country previously visited last fall. I also started myself in a south-easterly direction to examine the country surrounding Beaver Lake.

I am happy to say that the horses are enduring the severities of the winter very fairly; I have lost but two as yet, and I trust that the rest, with few exceptions, will outlive the winter. They are at present removed about twenty miles from the fort, for fear of being stolen by the Indians; they are guarded by three of my men stationed there, and constantly visited either by my secretary, Mr. Sullivan, or by myself. The horses we ride backward and forward for that purpose are being stabled at the fort.

The fort is built altogether of wood, consisting of one good-sized house two storeys high, inhabited by Mr. Christie, the officer in charge of this post and the Company's traders, and also by ourselves during our stay here. Adjoining this house are the storehouses of the Company, containing their goods and furs, besides the log houses inhabited by the men engaged by the Company, together with their wives and families. The whole is surrounded by wooden pickets or piles, firmly driven into the ground close together, and about 20 feet high.

In shape it is an irregular hexagon, about 100 yards long and 70 wide, and contains a population of about 40 men, 30 women, and 80 children, almost entirely supported on buffalo meat, the hauling of which, for sometimes upwards of 250 miles across the plains, is the source of great and most fruitless expense. Indeed, the labour and the difficulty of providing for a consumption of 700 lbs. of buffalo meat daily, and from so great a distance, would frequently become very precarious, were it not for an abundant supply of fish from Lake St. Ann, about 50 miles to the west of the fort, whence they are capable of hauling 30,000 or 40,000 in a season; these are a fine wholesome white fish, averaging four pounds weight each. Besides this, great quantities of provisions are traded here; it is the principal dépôt for provisions, as the several brigades of boats are most supplied from this place. Few fine furs are traded

here, those which are obtained being chiefly from half-breeds, belonging to a settlement recently made at Lake St. Ann's.

There is a Roman Catholic Mission, under the direction of two French priests, who have induced the half-breeds to cultivate the ground, and sometimes they realize very fair crops of barley and potatoes.

A very little agriculture is feebly carried on about Fort Edmonton, owing partly to the want of acquaintance with even the leading principles of agriculture, and principally from the disinclination of both men and women to work steadily at any agricultural occupation.

I have the honour of enclosing a letter from Dr. Hector on the subject of the geology of that portion of country which was explored last year by the Expedition, also the astronomical observations of last year, which I request may be forwarded to the Geographical Society. I shall reserve my observations, and those of my secretary, Mr. Sullivan, on the longitude of Edmonton until the state of the atmosphere will allow (perhaps) of greater accuracy, for it is important that its longitude should be more accurately ascertained than any one has obtained it hitherto.

I also enclose a separate record of observations taken on the comet, which I will feel much obliged by your Lordship's forwarding to the Astronomical Society.

As I had the honour to communicate my plans and intentions already to your Lordship in my letter of October last, I shall not take up any more of your time.

I have, &c.,

JOHN PALLISER, Captain,  
Commanding N.W. British American  
Exploring Expedition.

*Her Majesty's Secretary of State  
for the Colonies, &c.*

P.S. I am unable as yet to forward the accounts of the present financial year, as they have not yet arrived from Montreal, where they are sent to be priced by Sir George Simpson. J. P.

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Fort Edmonton, Saskatchewan, January 10, 1859.

SIR,—I have the honour to make the following report of my geological observations during the past season, in which are embodied only the principal results and general features of the country examined, the details being reserved for a more elaborate study and comparison than can be executed here.

On starting from Fort Carlton on 14th of June, 1858, we crossed the low tract of prairie land which is bounded to the west by that line of high ground which has been traced from longitude 103° w. sweeping to the N.W. to meet the south branch of the Saskatchewan at the elbow, known as the "Coteau des Prairies," and from that point being continued to the north branch as the Bad Hills and Eagle Hills, while across that river it re-appears as the Thickwood

and White Lake Hills. The average elevation of these plains above Carlton (which is built upon the first river level, 35 feet above the water) is 250 feet, or 2125 feet above the level of the sea, and on it rest isolated portions of the higher level which have survived the general denudation, rising as rounded hills from 300 to 400 feet in height, such as Moose Hill on the south branch, and the two Minetonass Hills (Creefor Hill by itself), one of which is opposite to Carlton and the other to Forte à la Corne. These plains are plentifully strewn with erratic blocks of all sizes, being fragments of the rocks of the granitic belt which runs to N.W. from Lake Superior to the Arctic Sea, with others of magnesian limestone and buff-coloured quartzose rock of Silurian age, which crops out all along the western flank of that range. A very remarkable line of the magnesian limestone boulders occurs at the distance of 20 miles above Carlton, crossing the country from the Thickwood Hills in a southerly direction towards the Moose Hills on the south branch.

This limestone contains the same indistinct fossiliferous markings as that at the Stony Hill behind Fort Garry. Some of these masses are of immense size, being made up of portions of several beds which only loosely cohere to form the block. They are all sub-angular, without any glacial markings, although some have their sides highly polished and smoothed from the buffalo rubbing against them. One of these blocks was measured, and computed to be 140 tons.

The nearest known point where this limestone occurs in situ, from whence these blocks may have been derived, is 170 miles distant to N.E.

Disregarding, for the sake of clearness, the order in which the country was examined, I now give at once an account of the whole "drift" phenomena observed.

As we travelled to the west the drift was found to preserve the same mineral character of variable proportions of sand and clay, having boulders interspersed, but chiefly with the clay predominating. The boulders, however, decrease in size, and those of limestone become very rare as the higher plains are gained. At Fort Edmonton, for instance, I found it difficult last winter to procure fragments with which to make lime for medicinal purposes, although the river bed is strewn with those of other rocks. Its depth also becomes much less, forming only a superficial covering to older strata, when observed in the river sections to the west of the Eagle Hills.

As we approached the Rocky Mountains, it quite disappears from the table lands, and is only to be found in depressions of the plain through which streams run, and even the existence of true drift in these places is rendered doubtful, owing to the prevalence of more recent deposits, which have been formed of its re-arranged materials.

At the altitude of 4000 feet above the sea, and at the distance of 50 miles from the mountains, there however occurs a very extraordinary group of blocks of granite, resting upon a high plateau formed of sandstone strata, to be afterwards mentioned. These blocks are of great size, one having been estimated to weigh 250 tons. Although lying miles apart, they seem to consist of the same rock, viz., a mixture of quartz with red felspar, the latter predominating, with only faint traces of mica disseminated in very minute flakes. No granitic rocks have been met with on this side of the watershed of the mountains, and it is not probable that any such exist, at least between the two branches of the Saskatchewan.

These blocks present smooth surfaces, although in general they are rhomboidal in form. Some are cracked into several pieces, which are quite detached, but have evidently at one time formed part of a whole.

If these blocks were derived from the granitic belt to the east, as I believe all the other boulders on the plains to have been, then they must have travelled at least from 400 to 450 miles. From the fact, however, that they are almost on the western verge of the drift deposit, and that the boulders imbedded were

found as a rule to diminish in size in that direction, it may be that the presence of these large blocks is due to very different agencies—different at least in the time of their occurrence.

Close in, along the base of the mountains, neither on the high plateaus nor in the profound valleys by which these are traversed, were there observed any traces of the drift, or its dispersed erratics. Within the outer range of the mountains, which are comparatively low and wooded to their summit, the valleys are occupied by immense deposits of rounded shingle, composed of fragments of the various rocks which have been found to compose the mountains. This shingle, which in some places is loose, and mixed with a large proportion of sand and gravel, in others is cemented by calcareous matter into a solid conglomerate. It fills up the valleys not only along the edge of the mountains, but also right into their interior, forming beautifully marked terrace levels along the streams. This is well exhibited on the north branch of the Saskatchewan, where these deposits skirt its wide valley for nearly 70 miles of its course through the mountains, expanding where it widens so as to form extensive plains, as at the Kutanie plain, and always affording a margin of level ground along the river, rendering the road very practicable.

Towards the upper ends of the valleys the calcareous matter of these deposits so increases as to replace altogether the shingle, when it becomes a fine gritty calcareous mud of glistening whiteness. This same deposit has a much larger development in the valleys on the west side of the watershed, forming terrace levels in exactly the same manner. I observed no shingle beds with it there, however, that apparently being replaced by fine sand and gravel.

In the valley of Bow River there is much less of this calcareous matter in the deposit, it having more of a loose sandy nature, and except at the entrance to the valley in the neighbourhood of the Bow Fort, rarely exhibiting the terrace levels.

In the smaller gorges, where streams come down from the mountains, it is replaced by an angular "breccia," of which patches cling in the most singular positions. This latter deposit is most likely of the nature of glacier moraines, although it is found where no glacier occurs anywhere in the neighbourhood. I found, however, that the glaciers in the chain had, at one time, extended a considerable degree beyond their present limits, and therefore at that time they possibly may have existed in portions of the mountains where now there are none.

The terrace deposits seem to reach pretty nearly the same altitude in different parts of the mountains, viz., about the height of 1000 feet above the level of the plains at their eastern base.

I found that, in crossing the different heights of land, the easiness of the pass corresponded with the degree to which these deposits had remained untouched, owing to peculiarities in the form of the valleys. In the case of every height of land, whether of those examined by Captain Palliser or by myself, with the single exception of the Vermilion pass, the slope is gradual to the east, but to the west the descent is with extreme rapidity. This arises from these deposits having been scooped out close up to the rocky nucleus of the height of land, by currents acting from the western side of the chain, while on the east the erosion has been much more feeble.

How much this may depend on the difference between the width of the valleys which pass through the flanking chains on the east side of the height of land from those on the west, I am not prepared to say, until the nature of the country to the west has been ascertained.

Currents acting on the chain while submerged, would of course be greatly modified in their action by any such differences.

Respecting the age of these deposits I am in doubt. They extend towards the east along the river valleys, at least shingle deposits of the same nature are found at a considerable distance from the mountains, in the valleys of the

north and south branches, and of the Red Deer River. Its relations to the drift have not been distinctly ascertained, as the boulders which mark its presence are only in that district of country found on rounded knolls away from the rivers.

From observations made last summer on the south branch, and during the winter on the north branch of the Saskatchewan, taken with those of this season, I found that the group of sandy clays with crystals of selenite and concretionary nodules of ironstone, which latter contain fragments of cretaceous fossils, extend from the Snake Portage (which is in lat.  $54^{\circ}$ , and long.  $111^{\circ} 30'$  w. nearly) upon the north branch, in a south-south-easterly direction, to the elbow of the south branch, the distance in a straight line between these two places being 240 miles. The north branch, which flows from the Snake Portage to south-east, exhibits in its banks sections of these clays until they disappear under the great depth of drift at the Eagle Hills, thus crossing this formation very obliquely, it forming a strip of not more than 60 miles in breadth; whether this strip be continuous or not cannot be ascertained, as the high plains which lie between the arms of this great river nowhere are cut to a sufficient depth to reach their level.

It is difficult to observe any dip, but I think they must have a slight inclination to north-east. At the Snake Portage these clays are of a clear blue colour, soft, and having selenite crystals in tolerable abundance. At Fort Pitt and at the elbow of the south branch they have much the same character, being of a dark purple brown colour, with the septariae very frequent, and the selenite only so in some parts. At the Eagle Hills they are not so moist, and form rather a compact shale of a bluish buff colour, much stained with ferruginous streaks; it cracks up into very small fragments with conchoidal surfaces: neither are the septariae so abundant. This formation here, if dried and hardened, would much resemble the shales observed at Long River, and at Fort Creek on the Assiniboine, during the summer of 1857. A little way above the Snake Portage (which place I again visited this autumn) hills rise above the plain level on both sides of the river to about 300 to 500 feet, such as the Black Hills, Snake Hills, and Egg Lake Hills; these consist of coarse grits formed of pink and green grains with a small amount of calcareous cement, quite the same as those observed in the neighbourhood of the Mountain House. They are in thin beds which weather into spheroidal masses, and between these beds of blue and purple clay are found. It is the same sandstone as is found throughout the Edmonton and Mountain House coal basins, forming the floor upon which they rest.

These basins are divided from each other by a great thickness of buff-coloured sandstone of much the same texture, but not so distinctly bedded, which forms a high ridge crossing the country from Red Deer River at the Nick Hills, to the Musquachis on Battle River to the north branch at Abraham's Gates. At these places it forms lofty precipices, which I think must be similar to those described as the ramparts on the Mackenzie and Peace Rivers.

On Red Deer River, in lat.  $52^{\circ} 12' N.$ , long.  $113^{\circ} W.$ , an extensive deposit of coal was discovered associated with the same sands and clays as at Edmonton. The coal forms beds of much greater thickness, however, one group of three beds measuring 20 feet, of which 12 feet were pure coal, the remainder being carbonaceous clays. At one place this coal was on fire, the whole bed exposed in a cliff about 300 yards in length being in a glow, the constant sliding of the bank continuing to supply a fresh surface to the atmosphere. For as long as the Indians remember, this fire had never been extinguished, summer or winter.

A heavy sulphurous and limy smell pervades the air for miles around.

The extent of this coal deposit along Red Deer River is for 14 miles. In

following up the river it is succeeded by the sandstone cliffs, apparently by substitution, as neither the coal group nor the beds of sandstone have any perceptible dip, and this is exactly the same manner in which the passage is effected between the same groups at the Mountain House.

Lower down on the river the coal is succeeded by white marls and sands, with beds of calcareous grit, which weather to a bright red colour. Among these beds there occur a great profusion of fragments of silicified exogenous wood. This group, however, was better exhibited on Battle River, where they dip to north-east at a very low angle. The valley of that river above its elbow is about 14 feet deep, and exhibits in its banks phenomena somewhat like those at La Roche Percée. The strata consist of banded clays and orange-coloured splintery limestone, with one bed quite filled with fragments of silicified wood, of an ashy or black colour. Towards the upper part of the section the clays are filled with sandy concretions, in some of which I found a few beautifully preserved fossils, the principal of which were a small *avicula*, a *cardium*, and other littoral shells.

There is also a bed of nine inches in thickness, composed entirely of rolled fragments of a species of *ostrea*, cemented together by coarse sand. This bed I detected at several points along the valley, and by using it as a test found that the whole group had a gentle inclination to north-east. At the point where we crossed Battle River a second time, in lat.  $52^{\circ} 28' N.$ , long.  $111^{\circ} 30' W.$ , in the bed of the stream, and at the foot of the section described above, the first coal met with in our progress westward was observed. Whether this be the same coal, however, as that on Red Deer River and at Edmonton, or a thin bed, such as was observed at La Roche Percée, and of quite a different age, I was unable to determine. If the former, then it is certainly overlaid by the *ostrea* and *avicula* beds; and these fossils when compared at home will throw much light on the true age of this coal. (I regret to say, that owing to the bursting of the hoops of the kegs in which they were packed for carriage to Edmonton from the Bow Fort, some of these fossils, as well as others, were lost on the road; but I hope yet to have an opportunity of procuring another set.)

This group of strata, characterized by the light-coloured marls which were found in Battle and Red Deer Rivers, was not observed along the north branch. The distance between the two points where they were found on the former rivers was 50 miles in a line due west.

The superficial strata which compose the prairie country preserve their horizontal character, as the Rocky Mountains are approached, until within 40 miles of the eastern limits of the true chain. At this distance they commence to undulate, at first gently, but soon assuming most intricate plications. The section along the Little Red Deer River displays the structure of the near range, which is wholly made up of the plications of the more superficial strata. The grits and clays of the Snake Portage again re-appear in this section, and are seen not only to change from their almost horizontal arrangement, but also to lose their original mineral character, the clays becoming indurated and converted into hard shales with a smooth soapy streak, while the sandstone beds are cleared in their original lines of false bedding, and rendered so very much harder, that in the summer when I observed isolated sections I was not sure of their identity, and only removed my doubts this winter by an examination of the continuous section afforded by Little Red Deer River.

From under this group the septaria clays arise, also much altered in character, but I obtained fragments of the same fossils that were found at Fort Pitt, and the elbow of the south branch of the Saskatchewan, so that I have no doubt of their identity. They are found on the west side of the outer range in the valley which intervenes between it and the main chain.

The Rocky Mountains, as far as the west side of the watershed, consist of parallel ranges running from N.W. to S.E. between the north branch and



Bow River, but south of that changing to nearly north and south. These ranges are in groups, divided from one another by trough-like valleys traversing the length of the chain. The two eastern ranges from the Bow Fort to the Sawback range are mainly composed of a blue limestone, sometimes cherty, sometimes compact, and sometimes crystalline, with fossils which belong either to the carboniferous or Devonian epoch. As a rule, these strata dip to the west; the same beds are, however, exhibited again and again, being thrown up in plications of great magnitude. Behind the Bow Fort, the mountains rise as huge cliffs made up of the cut-edges of these strata, elevated to the height of 3000 feet. Borne up on these limestones is a mass of strata composed of micaceous sandstone, with particles of carbon disseminated. This group also appears along Bow River and Deadman River, after they leave the mountains. Along with these sandstones are intercalated carbonaceous shales, among which are to be found traces of coal and carboniferous plants, of which latter one was a calamite, somewhat like *Calamites cannaformis* of the coal measures at home.

Resting on the flanks of the limestone ranges are patches of the septaria clays and grits, which are recognised at a distance by their earthy appearance. Such patches are found throughout the mountains at different points. Thus at the Vermilion River, the beds which, by their decomposition, give rise to enormous quantities of ochre along the courses of the smaller stream, seem to belong to this group. At the angle which this river makes, about fourteen miles from its source, there is a small patch of about one square mile in extent which presents an unmixed soil of ochre of a light reddish yellow colour, without a trace of vegetation on its surface.

To the west of the Sawback range the limestone was not observed, that range being composed of its bed cropping out vertically along the east side of a valley, in which stands Castle Mount, composed of horizontal beds of a hard quartzose sandstone, passing into a conglomerate, and capped by brown slaty shale. At the Kutanie plain, on the north branch of the Saskatchewan, this shale is seen to underlie the limestone.

The mountains which compose the height of land of the Vermilion Pass consist of the same rocks as the Castle Mount, but in descending Vermilion River a white slate is met with, which again is succeeded by a deep blue compact limestone, associated with a clay schist, curiously banded with red layers. On the north branch of the Saskatchewan, the mountains at its source are composed of this blue limestone and banded schist.

The very complicated relations of these strata render it impossible to form any sound view regarding their thickness or relative positions from data collected during one rapid survey, especially when it is remembered that they compose one of the most massive mountain chains in the world, the topography of which had to be learned step by step as the survey was made.

The most singular fact is, that no trace of the eruptive rocks which have caused the great convulsive movements of this portion of the earth's crust should be found in connexion with the dividing line of the mountains, from which the waters are thrown into the Gulf of Mexico, Hudson Bay, the Arctic and Pacific Oceans. The direction of these waters seems altogether to be determined by the arrangement of the superficial deposit filling up the valleys.

Towards the lower part of the Vermilion River, the schists are fractured by slaty cleavage, but which is not very perfect. More to the south, however, from Mr. Sullivan's notes, I find that the mountains along the east side of the Kutanie river valley are composed of true clay slate, which also forms those at both heights of land crossed by Captain Palliser's party.

I have, &c.,

(Signed)

JAMES HECTOR, M.D.

- Captain JOHN PALLISER,  
&c. &c.

XXIV.—*On Instruments and Observations for Longitude for Travellers on Land.* By COL. G. EVEREST, V.P.R.G.S., &c. &c.

SIR,—In a former paper I addressed some remarks to the President and Council of the Royal Geographical Society relative to the subject of observations for longitude by travellers on land; and as a wish was expressed on that occasion that I should revert to the subject, I have taken the earliest opportunity at my leisure to comply therewith.

It is manifest that besides the instability of the basis on which an observer stands at sea, there is this essential difference between the conditions of the seaman and landsman: the former requires the result of his labours for immediate use, whilst to the latter, time is of little or no moment; and provided his data be skilfully acquired and carefully and legibly registered, it is virtually immaterial whether at the instant, or after an interval of months, the result be arrived at. Hence we see that an acquaintance with the principles of spherical trigonometry, or, at any rate, a practical readiness in applying the rules and formulæ of that branch of mathematics, is indispensable to the nautical man, whilst the land-traveller needs no preparatory knowledge whatever in the work of computation.

Now the qualifications which we desire to be possessed by travellers should, like their baggage and other equipments, be reduced to the smallest compass; for geographical data of the highest order are of no intrinsic value, and serve solely to localize the names, scenery, manners, productions, and so forth, of the countries visited and described; and by how much we can lighten the task of obtaining those data, by so much do we leave the traveller at leisure to turn his attention to the latter more popular, interesting, and informatory particulars.

An acquaintance to a certain extent with the heavenly bodies is manifestly necessary to every traveller who purposes to determine the positions of places on the earth's surface by lunar observations: for example, he ought to be able to recognize the nine stars and four planets whose calculated distances from the moon are given in the 'Nautical Almanack,' pp. xiii to xviii of each month. Again, it is quite indispensable that the writing, and more particularly the figures, should be legibly and unmistakeably written in the field-book, for if there exists any uncertainty whether 5 or 3, 6 or 0, 9 or 7, and so forth, be meant, the time of those to whose lot the computation eventually falls, will be more or less taken up in reconciling chimeras.

Moreover, the traveller should have at his disposal a serviceable and portable instrument of which he is thoroughly master.

Now all these desiderata are of easy attainment, for a highly efficient altitude and azimuth instrument of the kind I should recommend is to be had for from twenty to thirty guineas; and any person whose faculties of touch and sight are unimpaired, and who has ordinary intelligence and powers of application, can, in the course of a few days, be able to manipulate it satisfactorily. There is indeed no comparison between the difficulty to a beginner of acquiring skill in the use of an altitude and azimuth instrument, on the one hand, and that of a reflecting instrument and false horizon, on the other, whilst the difference of price between the two sets of apparatus is nearly if not quite insignificant.

A practical acquaintance with the method of determining latitudes is of course indispensable, but even in that case it is desirable that the actual elements should be preserved, because, in working up these, there should be no doubt whatever as to the accuracy of the operation, to which there always is a liability when the results alone are given. With these few provisos I submit to the President and Gentlemen of the Council the accompanying form of Registry for Lunar Observations, which seems to comprise all that is requisite, and I will now, as briefly as I can, offer such explanations as appear needful to make the question intelligible.

I have, for convenience sake, assumed a latitude of  $30^{\circ}$  N. and longitude  $90^{\circ}$  E. of Greenwich, but as such place on the globe, though certainly existent, is not one with which I can claim a personal acquaintance, I have assigned to it the name of El Majhûl, which means the unknown.

I suppose that the instrument employed is an altitude and azimuth of 6 or 7 inches diameter to the azimuth circle, furnished with three verniers marked A, B, C, and that it has a vertical circle of 6 inches diameter, admitting of being turned over in altitude, and provided with two verniers D, E. Column No. 1 shows the position of the divided face of the vertical circle, whether to the left or right of the observer. Column No. 2 serves to identify the heavenly body observed. Column No. 3 gives the time by watch, which I suppose to be reliable on for accuracy during the intervals, for it must be remarked that it is not absolute time, but the differences due to those intervals that are needed. Columns Nos. 4, 5, 6, give the readings of the verniers, which being  $120^{\circ}$ , as near as may be, apart, do not need the insertion of the degrees except in the case of vernier A. Columns 7 and 8 give the readings of the verniers of the vertical circle, which is supposed to be divided for altitudes from  $0^{\circ}$  to  $90^{\circ}$  on each quadrant.

It is supposed that the movement in azimuth is always continuous, whether from left to right or *vice versa*, but it must be

here noted that on farther consideration I see reason to deviate from the plan of observing recommended in my former communication; for whereas I therein say that the moon should be the last object observed in the series, I find in truth that the intervals, which it is on all accounts desirable should be as short as possible, will be lessened by considering the moon as the intermediate object, and reducing the positions of the stars to her time considered as invariable.

One series being complete, with the divided face to the observer's left, I suppose the vertical circle to be turned over in altitude, which will bring the divided face to the observer's right, and increase the readings of vernier A from  $0^{\circ}$  to  $180^{\circ}$ ; and then by the completion of the second series, in like manner, all the errors of collimation and dislevelment of the transit axis, as is elsewhere abundantly shown, will be self-eliminated, and every sixtieth degree will have come under examination.

The inequality in the pivots of the transit axis is a source of error which can only be got rid of by the greatest care on the part of the instrument-maker; but if the observer is desirous to limit his labours to a single series, his instrument must be provided with a riding-level for adjusting the transit axis, and his vertical circle should be capable of reversing V for Y, as the best method of obtaining the error of collimation. These, however, do not compensate for the absence of the self-elimination principle by the means of the double series as above recommended, which not only gives greater accuracy, but needs no computation or adjustment.

My reasons for leaving space for a second double series are, that the errors of division to which every instrument is more or less liable, may be further corrected by bringing every thirtieth degree under one or other of the verniers; this would give greater prospect of accuracy, but, as it is not absolutely necessary, it may well be left to the option of the observer.

To fill up this form with the observed elements is all that can reasonably be expected from any traveller, and if the President and Gentlemen of the Council approve, I would suggest that a thousand or thereabouts of skeleton forms be lithographed and kept in the Library of the Society, to be supplied as occasion may require to those who are qualified and desirous to employ them in their travels.

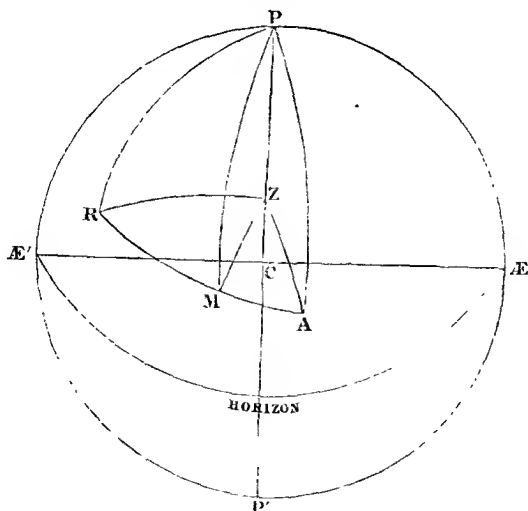
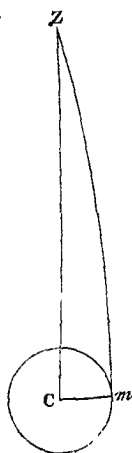
I might here close my remarks; but as there doubtless are many travellers who would prefer computing their own observations, and as a desire of this sort meets with my entire sympathy, I hope it will not be deemed intrusive if, on this subject, I add a few words.

In respect to the well-known corrections in altitude for observed places of the moon, parallax, refraction, semi-diameter, that due to the compression of the earth, &c., it would be quite needless to

say more than that they are well described in Treatises on Navigation, where the requisite Tables are given.

But there is in the case before us one point to be considered, which is not usually referred to in those treatises: I mean the correction in azimuth due to the moon's semi-diameter, which is of this nature. As  $Z$  is the pole of the horizon, if two vertical circles be drawn, of which one passes through the centre  $C$  of the moon's disk, and the other is tangential thereto, the latter is the one observed, and the former that sought. Now in the triangle  $ZCm$ ,  $Cm$  is the moon's semi-diameter, and  $Zm$  is the observed zenith distance, or  $a$  by my notation; and as this is a right-angled triangle, and  $Cm$  or  $r$  is very small, the value as affects the azimuth is manifestly  $Z = r, \sec. a$ .

In the accompanying diagram, which is intended to represent a stereographic projection of the celestial hemisphere adapted to the occasion of our acquaintance El Majhūl (the eye being at the point where the declination-circle of the nadir meets the equator), R, M, A are the positions of Regulus, the Moon, and Antares. Z is the zenith, P C P' is the mid-heaven, and  $\text{Æ C } \text{Æ}'$  is the equator. Now it is evident that the usual ta-



culated corrections having been applied, so that  $M$  may truly represent the moon's centre at the time of observation, the triangle  $PZM$  is constant, and will not be affected by the variations of either  $K$  or  $A$ .

But in either triangle, P Z R or P Z A, there are only two constants, P Z =  $\lambda$  and P R or P A =  $a$  or  $a'$ ; all the rest being functions of the variable angle P.

Thus  $a$  is a function of P determined by the equation

$$\cos a = \cos P \cdot \sin \lambda \cdot \sin a + \cos \lambda \cdot \cos a,$$

which, because  $\lambda$  and  $a$  are constant, may be put under the form

$$\cos a = A \cdot \cos P + B,$$

and if  $a'$  be the corrected value and  $a' - a = \Delta a$ , then

$$\Delta a = \left\{ \pm \left( \frac{da}{dP} \right) \cdot \frac{dP}{1} + \left( \frac{d^2 a}{dP^2} \right) \cdot \frac{dP^2}{1.2} \pm \left( \frac{d^3 a}{dP^3} \right) \cdot \frac{dP^3}{1.2.3} \right\} \cdot \operatorname{cosec} 1''.$$

Now,  $dP$  is the equivalent of the interval elapsed between the observation of the star and that of the moon; and if  $n$  be the number of seconds of time in that interval, then  $n \frac{3.14159}{12.60.60}$ , &c.,

will be the value of  $dP$  in parts of the radius unity; therefore  $L(dP) = L(n) + 5.86167$ .

Now, the differential co-efficients are as follows:—

$$1st. \left( \frac{da}{dP} \right) = A \cdot \frac{\sin P}{\sin a}.$$

$$2nd. \left( \frac{d^2 a}{dP^2} \right) = A \frac{\cos P}{\sin a} - A^2 \cdot \frac{\sin^2 P \cdot \cos a}{\sin^3 a}.$$

$$3rd. \left( \frac{d^3 a}{dP^3} \right) = -A \frac{\sin P}{\sin a} - \frac{3}{2} A^2 \cdot \frac{\sin 2P \cos a}{\sin^3 a} + A^3 \cdot \frac{\sin^3 P}{\sin^5 a} \cdot (2 + \cos 2a),$$

and the following are the numerical values in the case of the star Regulus, assuming  $dP$  to be an increment to the angle P due to an interval of 15 minutes of time:—

$$\left( \frac{da}{dP} \right) \cdot \frac{dP}{1} \cdot \operatorname{cosec} 1'' \quad 3^\circ 14' 33''$$

$$\left( \frac{d^2 a}{dP^2} \right) \cdot \frac{dP^2}{1.2} \cdot \operatorname{cosec} 1'' \quad - 10''$$

$$\left( \frac{d^3 a}{dP^3} \right) \cdot \frac{dP^3}{1.2.3} \cdot \operatorname{cosec} 1'' \quad - 2''$$

In a similar manner the correction for the observed azimuth in the like circumstances may be found as thus:—

If Z be the internal angle of the triangle P Z R at the time of

observation, and  $Z'$  that corresponding to the time of observing the moon, then, as  $Z$  is a function of  $P$ ,

$$(Z' - Z) = \left\{ \pm \left( \frac{dZ}{dP} \right) \cdot \frac{dP}{1} + \left( \frac{d^2 Z}{dP^2} \right) \cdot \frac{dP^2}{1.2} \pm \left( \frac{d^3 Z}{dP^3} \right) \cdot \frac{dP^3}{1.2.3} \&c. \right\} \text{cosec } ''.$$

Now the form of this function is derived from the equation

$$\cot Z = \cot a \cdot \sin \lambda \cdot \text{cosec } P - \cos \lambda \cdot \cot P,$$

and differentiating and substituting for  $\frac{\sin^2 Z}{\sin^2 P}$  its equal  $\frac{\sin^2 a}{\sin^2 P}$ , there

results

$$\left( \frac{dZ}{dP} \right) = \frac{1}{2} \sin 2a \cdot \sin \lambda \cdot \cos P \cdot \text{cosec}^2 a - \cos \lambda \cdot \sin^2 a \cdot \text{cosec}^2 a$$

which, as  $a$  and  $\lambda$  are constant, may be put under the form

$$\left( \frac{dZ}{dP} \right) = A' \cdot \cos P \cdot \text{cosec}^2 a - B' \cdot \text{cosec}^2 a.$$

If in this expansion there be put  $\left( \frac{da}{dP} \right) = X$ ;  $\left( \frac{d^2 a}{dP^2} \right) = Y$ , there

results

$$\left( \frac{d^2 Z}{dP^2} \right) = -A' \cdot \sin P \cdot \text{cosec}^2 a + 2 \cot a \cdot \text{cosec}^2 a X (B' - A' \cdot \cos P),$$

and, by a continuation of the same process, the differential coefficient  $\left( \frac{d^3 Z}{dP^3} \right)$  is to be found; but as it is very long, I will spare the President and Gentlemen of the Council further infliction of this dry matter, and confine myself to the computed numerical values, which are as follow:—

$$\begin{aligned} \left( \frac{dZ}{dP} \right) \cdot \frac{dP}{1} \text{ cosec } 1'' &= 1^\circ 48' 29'' \\ \left( \frac{d^2 Z}{dP^2} \right) \cdot \frac{dP^2}{1.2} \text{ cosec } 1'' &+ 47'' \\ \left( \frac{d^3 Z}{dP^3} \right) \cdot \frac{dP^3}{1.2.3} \text{ cosec } 1'' &\left\{ \begin{array}{l} + 2'' \\ - 10'' \\ - 0'' \end{array} \right. \end{aligned}$$

From these data a judgment may be formed as to how far it may be necessary to carry these computations. It does not follow that the second term of the series for  $\left( \frac{a' - a}{(1)} \right)$  will always be so small as  $10''$ ; neither will the corresponding term of the series for  $(Z' - Z)$  always be so large as  $47''$ . One thing only is quite clear, that the smaller the interval due to  $dP$ , the lighter also will be the labour of computation.

I will remark, however, that though it is indispensable to compute

the correct value of the term  $(a' - a)_{(1)}$  by the differential process above given, yet that labour may be spared in finding the corresponding value  $(Z' - Z)$  by the method which I pointed out in my former communication—as thus :—

$$\sin Z = \frac{\sin P}{\sin a_{(1)}} \cdot \sin a_{(1)} \text{ and } \sin Z = \frac{\sin P'}{\sin a'_{(1)}} \cdot \sin a_{(1)}$$

whereby the difference  $(Z' - Z)$  will be found without differentiation.

A few closing remarks may now be not out of place.

1st. The value of the angle  $P$ , due to the instant of observation of the star, must be found by means of the triangle  $PZR$  (or  $PZA$ ), whose three sides are given, the method of accomplishing which is so well known as to need no explanation. If this angle be applied to the right ascension of the star, it will give the right ascension of the mid-heaven at that instant.

2nd. The elapsed interval  $dP$ , reduced to seconds of a great circle, and applied to the right ascension of the mid-heaven, will give the right ascension of the mid-heaven at the time of observing the moon, or at the value  $P'$  of the angle at  $P$ .

3rd. The difference  $(a' - a)_{(1)}$  applied to  $a$  will give the zenith-distance of the star at the time of the observation of the moon.

4th. The difference  $(Z' - Z)$  applied to the observed difference of recorded azimuthal readings between the moon and star will give the value of  $Z$  in the triangle  $ZMR$  (or  $ZMA$ ).

5th. In the triangle  $ZMR$  (or  $ZMA$ ) thus corrected, the two sides  $ZM$ ,  $ZR$  (or  $ZA$ ), and the included angle  $Z$ , are known, and the arcs  $MR$  or  $(MA)$  may be determined by any of the known formulæ, the simplest (when a table of natural sines and cosines is at hand) being in my opinion

$$\cos MR \text{ or } \cos MA = \cos Z \cdot \sin ZM \cdot \left\{ \frac{\sin ZR}{\text{or } \sin ZA} \right\} + \cos ZM \cdot \left\{ \frac{\cos ZR}{\text{or } \cos ZA} \right\}.$$

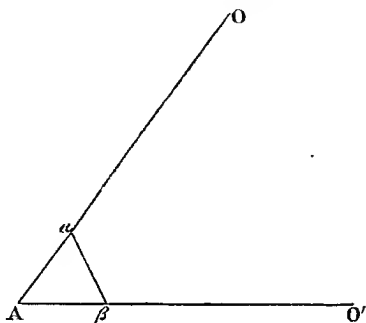
As to the rest of the operation, it is so familiar that any farther remarks would be superfluous.

Before closing this communication I may as well advert to another subject to which I drew the attention of the President and Gentlemen of the Council some months ago. I mean the measurement of the breadths of rivers or other inaccessible distances by travellers who are not supplied with any instrument for taking angles, in reference to which I have drawn up a table (see p. 323) showing the values of chords, sines, and cosines, of all angles from  $30^\circ$  to  $120^\circ$  inclusive, of the use and application of which I shall be happy to give a detailed explanation if desired.



As travellers are occasionally liable to be without instruments at hand wherewith to measure angles, and may be desirous to measure the breadth of a river or other inaccessible distance, the following method may perhaps be of service:—

*How to Measure an Angle, and obtain its Sine and Cosine.*

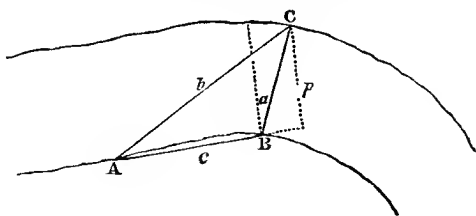


A is the position of the eye; O, O' are two distant objects, between which the angle at A is required.

Drive two pegs into the ground, one at *a* in the direction A O, and another at *β* in the direction A O', both at equal distances from A. Measure the distance *aβ*, and  $\frac{a\beta}{Aa}$  will be the chord of the angle A to radius unity, which call  $\gamma$ .

Then  $\sin A = \gamma \cdot (1 - \frac{1}{4}\gamma^2)^{\frac{1}{2}}$  and  $\cosine A = 1 - \frac{1}{2}\gamma^2$ .

If  $\frac{1}{2}\gamma^2$  is greater than 1, the angle A will be obtuse and its cosine negative.



Suppose you want to measure the breadth of a river, and that C is an eminent point which can be seen only from two points A and B, between which the distance AB can be conveniently measured. Let  $AB = c$ , and the perpendicular breadth of the river be denoted by  $p$ .

$$\text{Then } p = c \cdot \frac{\sin A \cdot \sin B}{\sin A \cdot \cos B + \cos A \cdot \sin B}$$

In this case  $p$  is assumed as the perpendicular breadth of a river, and equal to a line parallel to it drawn from A to the opposite bank, which is quite near

enough for rough purposes. If the angle B be nearly a right angle, then BC may be taken as the breadth, and the expression will be

$$a = c \frac{\sin A}{\sin A \cdot \cos B + \cos A \cdot \sin B}$$

If the traveller has a book of pocket logarithms, of course the matter is much simplified, for then  $L(\sin \frac{1}{2} A) = L(a \beta) + \text{ar. co. } L(A \alpha) + \text{ar. co. } L(2\beta)$ ; and knowing thus  $\frac{1}{2} A$ , the value of A is easily obtained. So likewise of B, and the denominator in the above case is only  $\sin(A + B)$  or its supplement.

The following table may serve in such cases to facilitate computation.

Column No. 2 contains the value of the chord to radius unity, or  $\frac{a}{A} \frac{\beta}{a}$  above adverted to. Column No. 1 the degree of a circle corresponding thereto. Columns Nos. 3 and 4 the natural sine and cosine of each angle between  $30^\circ$  and  $120^\circ$  inclusive:—

TABLE of ARCS from  $30^\circ$  to  $120^\circ$  inclusive, showing the Natural Chords, Sines, and Cosines of each.

Degrees.	Chords.	Sines.	Cosines.	Degrees.	Chords.	Sines.	Cosines.	Degrees.	Chords.	Sines.	Cosines.
30	.51764	.50000	.86603	60	1.00000	.86603	.50000	90	1.41421	1.00000	.00000
1	.53448	.51504	.85717	1	1.01508	.87462	.48431	1	1.42650	.99985	.01745
2	.55127	.52992	.84805	2	1.03008	.88295	.46947	2	1.43868	.99939	.03490
3	.56803	.54464	.83867	3	1.04500	.89101	.45399	3	1.45075	.99883	.05234
4	.58474	.55919	.82904	4	1.05984	.89879	.43837	4	1.46271	.99816	.06976
5	.60141	.57358	.81915	5	1.07460	.90631	.42262	5	1.47455	.99740	.08716
6	.61803	.58779	.80902	6	1.08928	.91355	.40674	6	1.48629	.99652	.10453
7	.63461	.60182	.79864	7	1.10387	.92050	.39073	7	1.49791	.99555	.12187
8	.65114	.61566	.78801	8	1.11839	.92718	.37461	8	1.50942	.99449	.13917
9	.66761	.62932	.77715	9	1.13281	.93358	.35837	9	1.52081	.99334	.15643
40	.68404	.64279	.76604	70	1.14715	.93969	.34202	100	1.53209	.99201	.17365
1	.70041	.65606	.75471	1	1.16141	.94552	.32557	1	1.54325	.99059	.19081
2	.71674	.66913	.74314	2	1.17557	.95106	.30902	2	1.55429	.98908	.20791
3	.73300	.68200	.73135	3	1.18964	.95630	.29237	3	1.56522	.98748	.22495
4	.74921	.69466	.71934	4	1.20363	.96126	.27564	4	1.57602	.98579	.24192
5	.76537	.70711	.70711	5	1.21752	.96593	.25882	5	1.58671	.98393	.25882
6	.78146	.71934	.69466	6	1.23132	.97030	.24192	6	1.59727	.98198	.27564
7	.79750	.73135	.68200	7	1.24503	.97437	.22495	7	1.60771	.97995	.29237
8	.81347	.74314	.66913	8	1.25864	.97815	.20791	8	1.61803	.97783	.30902
9	.82939	.75471	.65606	9	1.27216	.98163	.19081	9	1.62823	.97562	.32557
50	.84524	.76604	.64279	80	1.28558	.98481	.17365	110	1.63830	.97332	.34202
1	.86102	.77715	.62932	1	1.29890	.98769	.15643	1	1.64825	.97093	.35837
2	.87674	.78801	.61566	2	1.31212	.99027	.13917	2	1.65808	.96845	.37461
3	.89240	.79864	.60182	3	1.32524	.99255	.12187	3	1.66774	.96589	.39073
4	.90798	.80902	.58779	4	1.33826	.99452	.10453	4	1.67734	.96324	.40674
5	.92350	.81915	.57358	5	1.35118	.99619	.08716	5	1.68678	.96050	.42262
6	.93894	.82904	.55919	6	1.36400	.99756	.06976	6	1.69610	.95767	.43837
7	.95432	.83867	.54464	7	1.37671	.99863	.05234	7	1.70528	.95475	.45399
8	.96962	.84805	.52992	8	1.38932	.99939	.03490	8	1.71433	.95179	.46947
9	.98485	.85717	.51504	9	1.40182	.99985	.01745	9	1.72326	.94878	.48431
60	1.00000	.86603	.50000	90	1.41421	1.00000	.00000	120	1.73205	.86603	.50000

OBSERVATIONS for LUNAR DISTANCE taken at El Majhül in Thibet between Noon and Midnight at 9 P.M. of June 20, 1858. Approximate Latitude  $30^{\circ}$  North, Longitude  $90^{\circ}$  East. Watch used 0m. 0s. slow of  $\left\{ \begin{array}{l} \text{M. S. time.} \\ \text{Sidereal time.} \end{array} \right\}$  Rate  $\left\{ \begin{array}{l} \text{losing} \\ \text{gaining} \end{array} \right\}$  0m. 0s. per day.

Face of the Vertical Circle.	Names of Objects observed.	Times by Watch.	Readings of Azimuth Circle.			Readings of Vertical Circle.		REMARKS.
			A.	B.	C.	D.	E.	
Left	Regulus . . . .	8 45 0	91 21 15	21 10	21 15	23 39 35	39 35	All three objects to the south of the zenith. Regulus and the moon to the west of the meridian. Antares to the east of the meridian. The West and Upper Limb of the moon were observed.
Left	☽'s W. & U. Limb	8 50 0	26 16 40	16 35	16 40	42 46 40	46 40	
Left	Antares . . . .	8 55 0	336 31 10	31 0	31 5	29 52 5	52 0	
Right	Antares . . . .	9 5 0	158 56 15	56 10	56 10	30 41 15	41 10	
Right	☽'s W. & U. Limb	9 10 0	211 58 20	58 25	58 15	40 40 15	40 15	
Right	Regulus . . . .	9 15 0	274 58 35	58 35	58 35	17 11 30	11 25	
Right	Regulus . . . .							
Right	☽'s W. & U. Limb							
Right	Antares . . . .							
Left	Antares . . . .							
Left	☽'s W. & U. Limb							
Left	Regulus . . . .							

10, Westbourne Street, Hyde Park, W.  
November 7th, 1859.

## I N D E X

TO

## VOLUME THE THIRTIETH.

- Abájo, 220, 221, 233.  
 Abbeokúta, 214, 223, 233.  
 Abdallah, Sheik, 201, 204.  
 Abd-ul-Mejid, Sultan, 260.  
 Abhicate, 205.  
 Abotte, 141.  
 Abraham's Gates, 312.  
 Abutua, 156.  
 Abulla, 9.  
 Abyssinia, 112, 115, 123, 134, 136.  
 Acaponeta, 6.  
 Acapulco, 1, 45.  
 Accumco, 138.  
 Aehoa and Holderness, Messrs., 32.  
 Achoreus, 134.  
 Actæon's Mount, 264.  
 A'damáwa, 119, 123.  
 A'derér, 113.  
 Adi, 130, 131.  
 Adó, 217, 218.  
 Africa, 74, 134.  
 ———, Central, 135.  
 ———, Human Society in Northern  
     Central, 112 *et seq.*  
 ———, Northern, 256.  
 ———, South, 253.  
 A'gades, 120, 126.  
 Agbóm, 214, 215.  
 Agboro, 226, 227.  
 Agidabo, 215.  
 Agua Azul, 62, 63.  
 Agua Caliente, 20, 26.  
 A'iedi, 224, 231.  
 Ain-el-Koom, 209.  
 A'ír, 113.  
 Airac, 203.  
 A'íye, 225.  
 Ajéle, 212, 214, 219 *et seq.*, 225.  
 Ajita, 16.  
 A'kabli, 113.  
 A'kela, 114.  
 Akibídi, 215.  
 Alamos, 12, 17, 44.  
 Aldana, 51.  
 Aleppo, 207, 210, 211.  
 Alexander, Fort, 271.  
 Alexandria, 134, 135.  
 Algeria, 117, 123.  
 Ali, Jama, 199.  
 Ali, Mahomet, 131.  
 Altata, 5, 6, 11, 44.  
 Alviso, 2.  
 Al Vitrios, 35.  
 Alwerse, 240, 253.  
 Amara, 136.  
 Amatitlan, 158.  
 Amazons, 70, 71, 74.  
 Ambaca, 151, 153.  
 Ambato, 66, 74.  
 Amberbaki, 174.  
 Ambcrpoea, 174.  
 Amboellas, 150.  
 Amboyna, 172, 176.  
 America, Central, 58.  
 ———, North, 74, 293.  
 ———, South, 64, 260.  
 Amherst, Lord, 80.  
 Anahuac, 53.  
 Anderson, Mr., 19.  
 Anderson's Mine, Mountains of, 21.  
 Andes, 70 *et seq.*, 74.  
 ———, Cordillera of the, 9.  
 Andoma, 123.  
 Angangeo, 54.  
 Angcor, 193.  
 An-giang, 182.  
 Anglo-Mexican, the, 50.  
 Angola, 149.  
 Anguera, 161.  
 Animas, 35.  
 Ankodinovo, 169.  
 Antonina, 152.  
 Apaches, 29.  
 Aquajita, 13.  
 Arabia, South, 115.  
 Arabian Gulf, 112.  
 Arawán, 120.  
 Arboleta, 17.  
 Arctic Ocean, 282, 314.  
 ——— Regions, 75.  
 ——— Sea, 310.  
 Aretomys Hoodii, 276.  
 Arfak range, 172.  
 Arriola, Mr., 31, 40.  
 Arroango (or Roango), 142, 143, 145,  
     153, 155, 159.  
 Arruenba, 159.  
 Aru Island, 174.

- Asanti, 122.  
 A'sben, 113.  
 Ashanti, 118, 122.  
 Asia, 107, 108, 131.  
 Asiatic Archaeology, 185.  
 Asilio del Rosario, 6.  
 Assineboine Fort, 282.  
     — River, 271, 272, 273, 275.  
 Assouri River, 273.  
 Astachar, 209.  
 A'takór, 113.  
 Athabasca Portage, 283.  
 Atlantic Ocean, 53, 74, 114 *et seq.*, 137, 260.  
     — Southern, 264.  
 Atlas Chain, 112.  
 Aúdaghast, 125.  
 Aújila, 116, 125.  
 Aukár, 114.  
 Auld, Mr., 48.  
 Awton, 223.  
 A'zawád, 120.  
 Aztecs, 38.  
  
 Baba Aihava, 142.  
 Babadagh Mountains, 164, 166.  
 Baden, 47.  
 Bad Hills, 309.  
     — River, 270.  
 Bagdad, 200, 203, 204, 206, 209.  
 Baghena, 118.  
 Bagirmi, 122, 123.  
 Bágu-bágu, 215.  
 Bahr el Abiad, 128, 132.  
 Bahuerachic, 20, 38, 39, 40, 45.  
 Baikie, Dr., 121, 212.  
 Bajofaque, 38.  
 Balauta, 172.  
 Balebale, 151.  
 Balfour, Mount, 301.  
 Bali, 193.  
 Ball, Mr., 298.  
     — Mount Valley, 298.  
 Ballingall and Co., 3.  
 Ballunda, 142.  
 Balsora, 199.  
 Bamba, 151.  
 Bambuk, 118.  
 Banda, 123.  
 Bandar, 161.  
 Bangkok, 177, 181, 193, 197.  
 Bang Pa Kong River, 177, 178.  
 Banjarmassin, 176.  
 Baños, 71, 73, 74.  
 Baquiniapan, 36.  
 Barbary, 116.  
 Barengo, 131.  
 Barga, 118.  
 Bari, 131.  
 Barker, Captain, 76.  
 Barn Rock, 265.  
 Baro, 131, 161.  
  
 Barotze Valley, 139.  
 Barranca, 38, 48.  
 Barth, Dr. Phil., 112 *et seq.*  
 Barue, 155, 156, 158, 159.  
 Basle, 128.  
 Bata, 123.  
 Batopilas, 19, 31, 34, 36, 38.  
 Batoségachic, 26, 28, 29, 30, 31.  
 Battabong, 183, 185.  
 Battle River, 290, 285, 286, 312, 313.  
 Bawgawn, 215.  
 Bazartchuk, 163.  
 Beatson, General, 264.  
 Beaver Foot Pass, 296.  
     — River, 299.  
     — Lake, 308.  
 Bedé, 212, 232.  
 Bengal, 182.  
 Bengo, 161.  
 Benguela, 136, 137, 139, 147.  
 Benicia, 2.  
 Benin, 118, 216.  
     — Syrtis, 112.  
 Bennett, 262.  
 Bónuwi, 119, 123, 125.  
 Berg, 236.  
 Biafra, 121.  
 Biça, 144, 145, 153.  
     — Babica, 142.  
 Bien-ho, 184.  
 Bien-hoa, 182.  
 Bigsby, Dr., 268.  
 Bihe, 137, 138, 139, 150, 162.  
 Biheans, 138.  
 Bilna-road, 121.  
 Binne, 231.  
 Birni, 128.  
 Bissombo, 143.  
 Blackfoot, 285.  
 Black Hills, 247, 312.  
     — Sea, 163, 168.  
 Blackney, Lt. W., 93 *et seq.*  
 Blackwater River, 183.  
 Blakiston, Lieut., 267, 276, 279, 282, 283, 284, 286, 288, 289, 291, 295, 297.  
 Bloemfontein, 236, 238, 243.  
 Blonde Shoal, 94, 99.  
 Blue Kraus River, 233, 234.  
 Boa Vista, 137.  
 Boca de Rio, 157.  
 Bodegas, 65.  
 Bohea Hills, 86.  
 Bois des Sioux, 267.  
 Bolanos, the, 50, 52.  
 Bolgrad, 169.  
 Bolson di Mapini, 30.  
 Bombonaza, 71, 72, 73.  
 Bon, Cape, 115.  
 Bondu, 118, 119.  
 Boreas, 134.  
 Borman, Christian, 210, 241.  
 Borneo, 176.

- Bórnu, 115, 116, 120, 121, 124, 212, 232.  
 Borullo, 145.  
 Bosphorus, 168, 171.  
 Bossimo, 152.  
 Botha, Alwyn, 245.  
 Bourgeau, M., 267, 283, 284, 288, 289, 297.  
 Boussa, 148.  
 Bow Fort, 302, 311, 314.  
 — River, 284, 292, 297, 298, 311, 314.  
 Bowring, Sir J., 184.  
 Brava, 132, 136.  
 Brazeau, 279.  
 Brazil, 5, 15, 64, 263.  
 Breidenbach, 243.  
 Bridges, Mr., 92.  
 Brisco Range, 299.  
 Brown, Lieut., 157, 158.  
 Brown, Mount, 295, 300.  
 Bruce, 133.  
 Bruwco Place, 238.  
 Buámunggo, 138.  
 Bua, River, 143.  
 Bua Siviisithiwong, 194.  
 Bug River, 168.  
 Bulgaria, 171.  
 Bulgarian Hills, 162.  
 Bull Lake, 287.  
 Bullock, Lieut., 100.  
 Bunda, 150, 151.  
 Bura, 128.  
 Bushman River, 233, 234.  
 Bussora to Aleppo, 198 *et seq.*  
 Bússumo, 122.  
 Bustamente, 35.  
 Bythesea, Captain, 76.  
 Cabandangollo, 143.  
 Cabanga, 144, 145.  
 Cabenze, 151.  
 Cabita, 150.  
 — Catema, 151.  
 Cabuita, 150.  
 Cachabi, 69.  
 Caconda, 162.  
 Caetulavale, 161, 162.  
 Cahava, 150.  
 Cahinga, 141, 152.  
 Caimbo River, 138.  
 Cajurichie, 26.  
 Calavas, 17, 36, 37.  
 Callia, 133.  
 California, 2, 4, 5, 13, 19.  
 —, Gulf of, 6, 17, 28, 40.  
 Calita, 8.  
 Calle, 3.  
 — de los Sacrificios, 3.  
 Callumbange, 142.  
 Camanches, 29.  
 Cambodia, 177 *et seq.*, 184 *et seq.*  
 — Lake, 195.  
 Cambodia, Saigon, 183.  
 —, Upper, 183.  
 Camimbe, 140, 141, 142.  
 Camoa, 12.  
 Camossango, 142.  
 Campbell, Jas., 182 *et seq.*  
 Cam-pong-som, 183.  
 Campus, Messrs., 48.  
 Cancoma, 161.  
 Canelos, 71, 72, 74.  
 Cangalla, 160.  
 Cangomba, 152.  
 Canton, 91.  
 Cape Verde Island, 265.  
 Carlton, 267, 278, 280, 281, 295, 297, 299, 310.  
 — Fort, 267, 268, 271, 276, 279, 309.  
 Carmo Quiribe, 151.  
 Carnbée, Baron Melvill van, 175.  
 Carpathian Mountains, 162, 171.  
 Carr, Mr., 38, 40.  
 Carrizal, 10.  
 Caruleneange, 154.  
 Casade Mountains, 297.  
 Casas de las Partidas, 46.  
 Cassabe, 139, 150, 151.  
 Cassange, 151.  
 Cassongae River, 141.  
 Cassunha, 161.  
 Casteel Poort, 236, 238.  
 Castella, Juan de Nova, 261.  
 Castle, Mount, 297, 298, 301, 314.  
 Castonge, 136.  
 Catanga, 150.  
 Catende, 151.  
 — Mucanza, 150.  
 Cathape, River, 162.  
 Catma Cabita, 151.  
 Catorce, 50.  
 Cavendish, 261, 265.  
 Cavern Range, 252.  
 Cavulancango, 152.  
 Cayambe, 68.  
 Cazembe, 150, 151, 152, 153, 154.  
 Cerocachic, 38.  
 Cerro Grande, 58.  
 — Prieto, 40.  
 Ceylon, 194, 197.  
 Chaanbugue, 151.  
 Chad or Tsád, 113, 117.  
 Chagres, 293.  
 Challa, 151, 153.  
 Chamboriro, 142.  
 Chamopa, 141, 151.  
 Chantiboon, 177, 180, 181, 185.  
 Chanvoriro, 152.  
 Chapultepec, 48.  
 Chaumette, 138.  
 Chavahua, 151.  
 Chelim, 154.  
 Chee-chow, 97.  
 Chee-chow-foo, 83

- Chegogo, 161.  
 Chch-kiang, 86.  
 Chemba, 161.  
 Cherbourg, 264.  
 Chesterfield House, 288.  
 Chicova, 156.  
 Chief Mountain, 289.  
 Chieng Rai, 195.  
 Chihuahua, 6, 15, 18, 20, 24, 26, 27, 29,  
     30, 31, 32, 33, 34, 38, 40, 42, 43.  
 Chikango, 156.  
 Chimborazo, 64, 65, 68, 71, 74.  
 China, 75, 77, 79, 85, 86, 89, 91, 100,  
     176, 178, 182, 254.  
     —, Northern and Central, 95.  
 Chingamera, 156.  
 Chimpas, 19, 31.  
 Chin-kiang, 78, 95.  
 Chin-kiang-foo, 78.  
 Chinto Capinda, 154.  
 Chin-tze-shan, 85.  
 Chipongo, 158.  
 Chiramba, 161.  
 Chire, 144.  
 Chitassa, 156.  
 Chituze, 161.  
 Chobe, 138.  
 Choco, 69.  
 Chois, 16, 18, 20, 21, 24, 34, 36, 40.  
 Cholchicomula, 58.  
 Chouga, 165.  
 Christie, Mr., 308.  
 Chuquipoyo, 65, 66.  
 Chuze, 161.  
 Ciengita, 14.  
 Cillier, 228.  
 Cinaloa, 2, 6, 14, 15, 17, 20, 30, 38,  
     40, 43, 44.  
 Clarke, Rev. Mr., 217, 218, 220, 221,  
     231.  
 Clear Water River, 279.  
 Clement, Mr., 45.  
 Clochard, 35.  
 Coandere, 138.  
 Coango, 151.  
 Coanza, 137, 138, 148, 150.  
 Cochín China, 178, 180, 185, 197, 198.  
 Cocibocca, 58.  
 Coimbra, 150.  
 Cold Water Lake, 270.  
 Colexinga, 151.  
 Collinson, Capt., 76, 77, 100.  
 Columbia Portage, 290.  
     — River, 290, 292, 296, 299, 301.  
 Colville, Fort, 291, 293.  
 Comasa, 144.  
 Comanja, 51.  
 Comayagua, 60, 62, 63.  
 Combe, M. Le, 280.  
 Conde de Valenciana, 52.  
 Congo, 148, 261.  
 Condes de Reglo, 52.  
 Condes de Rul, 52.  
 Coote, Sir Eyre, 198 *et seq.*  
 Coquema, 137, 138.  
 Coqui's Drift, 241.  
 Coras, 12.  
 Cordillera, 17, 18, 20, 24, 34, 38, 39, 44,  
     47, 65, 71, 72.  
     — Muxenga, 149.  
     — or Sierra Madre, 3.  
 Cordon, 58.  
 Cordova, 49.  
 Corimba, 152.  
 Corralitos, 28.  
 Cortez, Port, 63.  
 Cosala, 7.  
 Cotacache, 68.  
 Coteau des Prairies, 272, 275, 309.  
 Cotopaxi, 66, 68, 71.  
 Coue River, 138.  
 Couir Lake, 131.  
 Court, Mr., 92, 95.  
 Couxito, 142, 152.  
 Coyote, 14.  
 Coyotitlan, 8.  
 Crawford, Mr., 184.  
 Cree, 285.  
 Creefor Hill, 310.  
 Crimea, 168.  
 Cronje's Farm, 241, 243.  
 Cross Lake, 270.  
 Cross Woods, 284.  
 Crowther, Mr., 121, 230.  
 Crow Wing, 267.  
 Cruces, 17.  
 Cuanda (Quando), 138.  
 Cubango, 138, 162.  
 Cuenca, 64, 70, 71.  
 Cuenti, 138.  
 Cubulai, 137.  
 Cuito de Zambueria River, 128.  
 Cuito River, 138.  
 Chlaquimba, 162.  
 Culiacan, 6, 16, 18, 45.  
 Cumungo, 150.  
 Camsha, 138.  
 Cunda, 143.  
 Cunde River, 137.  
 Cundu Iringo, 152.  
 Cuncue River, 148, 162.  
 Cunhinga, 141.  
 Curaray, 73.  
 Curinipo, 12, 18.  
 Cusihiurachic, 26, 29.  
 Cuti River, 138, 139.  
 Cutonge, 137, 139, 140.  
 Cutupe, 137.  
 Cydamus, 256.  
 Cypress Hills, 289.  
 D'Abbadie, M., 133.  
 Da Costa, 151.

- Dafel's, 237.  
 Dahóme, 122.  
 ——— Proper, 122.  
 Dallas, Mr., 282.  
 Dampier, 253.  
 Dana River, 130, 131, 149.  
 Dannbe, 162 *et seq.*  
 ———, Delta of the, 164.  
 ———, Lower, 162 *et seq.*  
 Dár Banda, 123.  
 Dár-Fúr, 123.  
 Dasába, 228.  
 Da Silva, Galvao, Journey of, 155 *et seq.*  
 Daule, 65.  
 Deadman River, 314.  
 Deadwood, 264.  
 De Barros, 119.  
 Debbelte Berg, 245, 250.  
 De Beer, 234, 238.  
 De Bruyn's, 240.  
 Deel Kraal, 253.  
 Delagoa Bay, 247, 250.  
 De la Torre, Isidoro, Messrs., 31.  
 Delgado, Cape, 146, 159.  
 Del Rosario, Señora, 23, 156.  
 Derge, 255, 258.  
 De Saussure, H., 53 *et seq.*  
 Devil's Bite Range, 88.  
 Dhiúli, 118.  
 Diana Peak, 264.  
 Dickson, C. H., 255 *et seq.*  
 Dililo Lake, 152.  
 Dingaan, 234.  
 Dinh-tuong, 182.  
 Diria, 133.  
 Dnieper, 168.  
 Dniester, 168.  
 Dobbie, Mr., 38.  
 Dobrudscha Mountains, 165, 166.  
 Dofundo, 151.  
 Dog Lake, 269.  
 ——— Portage, 269.  
 Dolores, 51.  
 Domue, 161.  
 Don Adolpho, 29.  
 ——— Angelo, 132.  
 Dongnai, 182.  
 Dongola, 121.  
 Don Pancho de Viniegra, 38.  
 Doorp River, 241, 253.  
 Dorey, 172 *et seq.*, 177.  
 Drakensberg, 233, 234, 235, 236.  
 Drinkwater Point, 77.  
 Druppel Kelder, 252.  
 Dunavitza, 164.  
 Duncan, 122.  
 Dupercey, 172.  
 Durango, 6, 11, 30, 51.  
 Dwars Berg, 246, 250.  
 Eagle Hills, 278, 281, 284, 285, 309,  
 310, 312.  
 Ear Hills, 285.  
 Ebony Island, 265.  
 Eehajoa, 12, 18.  
 Ecuador, Explorations in, 64 *et seq.*  
 Edeji, 229.  
 Edmonton, 276 *et seq.*, 288, 291, 302,  
 309, 312, 313.  
 ———, Fort, 278 *et seq.*, 310.  
 Edwards, Mr. Amory, 59, 60, 62.  
 Effon, 222, 223, 225, 231.  
 E'gan, 227.  
 E'gbe, 224, 225, 226.  
 Egg Lake Hills, 312.  
 Egypt, 120, 123, 125, 126, 127, 131, 134.  
 E'jeha, 226, 227.  
 Ejebo, 212.  
 Ekpe River, 214.  
 Eland River, 236, 237, 255.  
 El Carmen, 35.  
 El Dorado, 2.  
 Elephant Pass, 251.  
 El Fuerte, 6 *et seq.*, 34 *et seq.*, 44, 45.  
 Elgin, Lord, 76, 93, 94, 96, 98, 99.  
 El-Koom, 209.  
 Ellice, Fort, 272, 273, 275.  
 Ellis, Mr., 83, 94.  
 El Mina, 126.  
 El Nopal, 32.  
 El Oro, 51.  
 "Elota," 8, 9.  
 El Palma, 13.  
 El Parral, 32.  
 El Paso, 30.  
 El Rhodes, 38.  
 El Salto, 61.  
 Enarea, 131, 133, 136.  
 England, 49, 73, 276.  
 Erasmus, Peter, 299.  
 Ergshéhsh, 114.  
 Erhardt, Mr., 131.  
 Eriggi, 114.  
 Eseji, 228.  
 E'shon, 221 *et seq.*, 231.  
 E'shu, 221, 223, 224.  
 Esmeraldas, 64, 69, 70.  
 Espinosas of Catorce, 52.  
 Esterhuys, Jan, 244.  
 Euphrates, 199, 204, 206.  
 Europe, 5, 35, 44, 131.  
 Everest, Col., 315 *et seq.*  
 Fagongas, 52.  
 False River, 238.  
 Fangan, 212.  
 Farmer, Mr., 94.  
 Faro, 123.  
 Ferreira de Andrade, Joaquim, 162.  
 Fezzán, 113, 117, 121.  
 Fittri, 121, 123.  
 Flagstaff Hill, 265.  
 Fokien, 86.  
 Folsom, 2.



- Foochang, 98.  
 Fop River, 86.  
 Forbes, Mr., 122.  
 ———, Mount, 301.  
 Forked Creek, 271, 272, 275.  
 Forrest, Mr. E. F. J., 182, 184.  
 Fôte à la Corne, 310.  
 Fresnillo, 51.  
 Friar Portage, 269.  
 Fúr, 123.  
 ——— Proper, 123.  
 Fura, 155, 156.  
 Fúráwi Fertít, 123.  
 Fushan, 94.  
 Fúta, 119.  
  
 Gabriel Hill, 279.  
 Gágho, 125.  
 Galdeana, 33.  
 Galatz, 163, 165, 167, 171.  
 Gallas, 133.  
 Gambia, 115, 119, 127.  
 Gamitto, 152, 153, 154, 157, 158.  
 Ganges, 115.  
 Ganguellas, 138.  
 Ganking, 84, 85, 86, 97, 99.  
 Gaoga, 121.  
 Garbo, 133.  
 Garry, Fort, 268, 271, 310.  
 Gatsche Rand, 252.  
 Geldenhuys, Piet., 252, 253.  
 Germany, 259.  
 ———, Southern, 42.  
 Geyser, 57.  
 Ghadámis, 113, 125, 255 *et seq.*  
 Ghát, 113, 125, 259.  
 Ghit, 113, 114.  
 Gibbut, 206.  
 Gibraltar, Rock of, 81.  
 Gidi, 114.  
 Glacier Lake, 301.  
 Glass, Mr., 45.  
 Göber, 120, 125.  
 Gógó, 125, 126, 223.  
 Golden Island, 78.  
 Gold-fields, Eastern, 73.  
 Golvingo Alto, 153.  
 Gondar, 134.  
 Good Hope, Cape of, 148, 261, 262, 266.  
 Goodsir-Valley Mount, 298, 299.  
 Gordoas of Zacatecas, 52.  
 Gorge, the, 298.  
 Go-sat-tran, 182.  
 Graça, 139, 150, 151.  
 Granados, Messrs., 11.  
 Grand Canal, 78, 95.  
 Grande Coulée, 285.  
 Grass Valley, 2.  
 Great Belly River, 289.  
 ——— Britain, 74, 75.  
 ——— Cordillera, 22.  
 Greeuwich, 131.  
  
 Grey, Earl, Range, 228.  
 Grotto Peak, 297.  
 Guadalajara, 6, 45, 46, 47.  
 Guadalupe, 23, 24, 33, 48.  
 Guadalupe y Calvo, 31.  
 Gualala, 62.  
 Gualaquiza, 70.  
 Guanajuato, 36, 45, 47, 48.  
 Guanaxuato, 50, 51, 52.  
 Quantitlan, 48.  
 Guatemala, 58.  
 Guaxe, 144.  
 Guayaquil, 64, 65, 68, 70, 71.  
 Guaymas, 17, 44, 65.  
 Guerretaro, 48.  
 Guiana, 196.  
 Guinea, Gulf of, 185.  
 Gúmodi, 216.  
  
 Haffar, 199.  
 Hagla, 210.  
 Hakluyt, 262.  
 Halenga, 139.  
 Halley, Dr., 263.  
 ——— Mount, 263.  
 Halpuhuahua, 52.  
 Hamataculla, 145.  
 Hamatapa, 145, 146.  
 Hamburg, 47.  
 Hamdaalkihi, 124.  
 Hamengoena River, 140.  
 Hankow, 76, 89, 90, 92, 98.  
 Han River, 90.  
 Hanyang, 90, 91, 98.  
 Harmse, Mr. W.'s Farm, 245.  
 Harris, Major, 133.  
 Harris Smith, 235, 236, 238, 254, 255.  
 Hartley, Mr., 168.  
 Harvey Point, 77, 94.  
 Hateen, 182, 183.  
 Hatien River, 183.  
 Hatting, Dewald, 237, 254.  
 Haurán, 206.  
 Hausa, 117, 119, 124, 125.  
 Hawkins, Capt., 282, 283, 286, 291, 296.  
 Hawkins, Mr., 289.  
 Havanna, 49.  
 Hector, Dr. J., 267, 276, 277, 281,  
 282, 283, 284, 286, 288, 302, 308,  
 309, 314.  
 Hejra, 127.  
 Hemingse's, 240.  
 Hepe River, 142.  
 Hermosillo, 44.  
 Herodotus, 126, 134.  
 Hex River, 250.  
 Hibeno, 140.  
 Hicabere, 137.  
 Hichens, Mr. R. S., 1.  
 Hieuça, Major, 143, 145.  
 Hiculai River, 139.  
 High Knoll, 265, 266.

- High Peak, 264.  
 High Sierra, 17.  
 Himalayas, 115.  
 Hinderer, Rev. D., 214, 233.  
 Hindostan, 185, 191, 196.  
 Hing-kwoh, 89.  
 Hionga, 146.  
 Hochow, 80.  
 Hockin, Mr., 45.  
 Hogár, 113.  
 "Hold Fast Tom," 262.  
 Hol Fontein, 251.  
 Holland, 242.  
 Honduras, 58, 59, 60, 62, 63.  
 Hooker, Mount, 295, 300.  
 Hooker, Sir William, 267.  
 Hookow, 86, 87.  
 Hoonan, 98.  
 •Hoopeh, 86, 88, 89.  
 Hooper, 94.  
 Hoogveld, 245.  
 Hörn, Cape, 9.  
 House, Rev. D., 182.  
 Ho-yeh-chow, 83.  
 Huacaybo, 17, 22, 24, 26, 29, 37.  
 Huahuachic, 25, 26, 29, 38.  
 Huallaga, 71.  
 Huaranda, 65, 66.  
 Huasacaibo, 29.  
 Hueicolhuacan, 10.  
 Huertua, 143.  
 Hudson Bay, 267, 278, 282, 308, 314.  
 Hudson Bay Company, 293, 295.  
 Huila, 161.  
 Húlet Haurán, 206.  
 Humboldt, Baron, 196.  
 Humboldt Bay, 176.  
 Humuya River, 60.  
 Humvino River, 162.  
 Hwang-chow, 89, 98.  
 Hydalgo, 32.  
  
 Ibádan, 212 *et seq.*, 231, 233.  
 Ibarra, 68, 69.  
 Ibarra and Orantio, Messrs., 17, 44.  
 Ibo, 145, 146, 147, 159.  
 Ibraila, 163.  
 I'bukun, 220.  
 Iceland, 57.  
 Idda, 217.  
 I'fe, 215, 216, 231.  
 Igbómna, 221, 222, 223, 231.  
 Igdi, 114.  
 Ijsha, 216, 217, 219, 220, 231.  
 Ijil, 114.  
 I'la, 218, 219, 220, 221, 231.  
 Ilésa, 216 *et seq.*, 221.  
 Illiniza, 63.  
 Ilopango, Lake, 58.  
 Ilorin, 212, 213, 214, 220, 223, 225,  
 226, 231.  
  
 Imbabura, 64, 68, 70.  
 Incas, 73.  
 India, 115, 125.  
 Indian Archipelago, 175.  
 Indian Ocean, 133, 136.  
 Indus, 115.  
 Inhabaruavo, 161.  
 Inhacaranga, 161.  
 Inhalupunda, 161.  
 Inhanzana, 155.  
 Inhumbanj, 144.  
 Inhnnerma, 161.  
 Inhurassue, 161.  
 Insálah, 113.  
 Intibucat, 60.  
 Iralla, 142.  
 Iréshi, 221.  
 Iron Gates, 162, 163.  
 Islám, 118.  
 Island, Upper, Portage, 269.  
 Isle of Wight, 261.  
 Ismail Chatal, 163, 164, 169.  
 Itaófa, 217.  
 Itáokon, 215.  
 Itza, 58, 59.  
 Iwó, 212, 213.  
 I'yc, 223.  
 Iztacihuatl, 48.  
  
 Jack Fish Lake, 278, 286.  
 Jackson, Port, 265.  
 Jacobus, 243.  
 Jagga, 129.  
 Jaitique River, 60, 61.  
 Jalisco, 6.  
 Jálo, 119.  
 Jama Ali, 199.  
 Jamaica, 1.  
 James, Sir H., 160 *et seq.*  
 James Town, 263, 266.  
 James Valley, 261, 262.  
 Janet, 113.  
 Jángi, 230.  
 Jan Koster, 238.  
 Jan Oosthuysen's, 238.  
 Jansen, 240.  
 Jaripeo, 54, 55, 56.  
 Java, 175, 192.  
 Jebel Mountains, 257, 258, 259.  
 Jecker and Co., 3.  
 Jenakhéra, 123.  
 Jesháya, 223.  
 Jesus Maria, 24, 26, 27, 28, 51.  
 Jesus Maria y José, 51.  
 Jinni, 122, 124.  
 João Francisco, 161 *et seq.*  
 Jobie Island, 174.  
 Johnson, Messrs., 73.  
 Jombo, 151.  
 Jones, Luent., 76.  
 Jonga River, 140.  
 Juba, 148.

- Júli, 118.  
 Julius Cæsar, 134.  
 Jura Mountains, 128.  
  
 Kaarta, 118.  
 Kabin, 178, 179.  
 Kadiaro Point, 128.  
 Kaffa, 131, 133, 136.  
 Kaffa Souro, 133.  
 Kakabica Falls, 268, 269, 270.  
 Kahenda, 150.  
 Kakanda, 224.  
 Kamao, 182.  
 Kambia, 118.  
 Kamen, 121, 182.  
 Kaministoquoiah River, 269, 270.  
 Kampoot, 177, 181.  
 Kan River, 86.  
 Kananaski Pass, 296.  
 ——— River, 290, 292.  
 Kangeo, 184.  
 Kaugkao, 183.  
 Kano, 124, 125, 126, 259.  
 Karmunsa, 183.  
 Karoon, 199.  
 Katongo, 137, 139, 140, 141.  
 Katsena, 118.  
 Keating, Mr., 268.  
 Kebbi, 119, 124, 126.  
 Ke-chow, 88.  
 Kedgwin, Captain, 262.  
 Ke Island, 174.  
 Kedrilis Branch, 164, 169, 170.  
 Kellett, Capt., 70.  
 Kéi-owí, 113.  
 Kenia Mountains, 130, 131, 133.  
 Kerenia, Mount, 131.  
 Kerr, 94.  
 Ke-tow, 89.  
 Kew-hsien, 81, 82.  
 Kew-keang, 88, 97, 98, 99.  
 Kew-lung-keang, 182.  
 Khandal, 150.  
 Khartoum, 131.  
 Kho River, 183.  
 Kiang-si, 85, 86.  
 Kiekling Horse Pass, 296.  
 ——— River, 299, 300.  
 Kieu-hien, 96.  
 Kikuyú, 130, 131.  
 Kilia Branch, 163 *et seq.*, 169.  
 Killimandjaro, 128, 129, 130, 131, 136.  
 ——— and the White Nile,  
     128 *et seq.*  
 Kimborate, 133.  
 King, D. O., 177 *et seq.*  
 King, Major, 194.  
 Kingston, 1.  
 Kinshan, 78.  
 Kirenia Mountains, 130, 131, 133.  
 Kišlema, 129.  
 Kitui, 130, 131, 150.  
  
 Kivoi, 130.  
 Klip River, 234  
 Knight, Mr., 6, 38, 39, 40, 15.  
 Knoblechter, Dr., 132.  
 Kokándá, 232.  
 Komádugu, 128.  
 Kong, 118.  
 Koom, 209.  
 Kordofán, 123.  
 Korner, 199.  
 Korórrofa, 120.  
 Krapf, Dr., 130, 131, 132, 133.  
 Krokodyl River, 250.  
 Kroo, 118.  
 Krú, 118.  
 Krüger, S., 245, 246.  
 Kúdan, 229, 230.  
 Kuenda, 132, 133.  
 Kulféla, 122.  
 Kúta, or River King, 228.  
 Kutanie, 311.  
 ——— Passes, 293, 288, 292, 296.  
 ——— Northern Pass, 296.  
 ——— Plain, 301, 314.  
 ——— River, 290, 291, 296, 297, 298,  
     299, 314.  
 Kwa-chow, 79.  
 Kwang-tung, 86.  
 Kwóra, 213, 217, 223, 225, 227, 230,  
     231.  
  
 La Antonia, 24.  
 Laboshi, 229, 230.  
 La Cabañeña, 32.  
 La Cata, 35.  
 Lacerda, 149, 152, 153, 157, 158, 159.  
 La Chine, 293.  
 La Cruz, 32.  
 Ladder Hill, 266.  
 Ládi, 224, 228, 232.  
 Ladislaus, M., 150, 151.  
 La Esembierto, 24.  
 La Franceseña, 32.  
 Lagoon, 83.  
 Lagos, 47, 212, 213, 214, 219.  
 La Grande Prairie, 295.  
 Laguna de Guzman, 28.  
 La Honda, 32.  
 Lakahia Island, 176.  
 Lake of the Thousand Isles, 269.  
 Lake of the Woods, 268, 270.  
 Lake Pass, 296.  
 Lalupawn, 213.  
 La Luz, 45, 47, 51.  
 La Morita, 15.  
 Lamupa, 145.  
 Lancaster, Sir James, 262.  
 Land Observations for Longitude for  
     Travellers, 315 *et seq.*  
 La Nevada, 35.  
 Langshan, 77, 99.  
 ——— Crossing, 99.

- Langshan Hills, 94.  
 Lan-kaon, 82.  
 Lan-keang-ke, 84.  
 La Noria, 13.  
 Lan-tsan, 182.  
 Laos, 182, 183, 195, 197.  
 La Pastrana, 35.  
 La Patrona, 24.  
 La Platana, 13.  
 La Prieta al Ancona, 24.  
 La Primera, 35.  
 La Quebradilla, 32.  
 Lashi, 219.  
 Latacunga, 66, 67, 73.  
 Latembwa, 150.  
 La Terrenates, 32.  
 La Tola, 69.  
 La Valenciana, 35.  
 La Veta Grande, 32.  
 Laybach, 130.  
 Lazy Portage, 269.  
 Leaf Lake, 267.  
 ——— River, 267.  
 Leambaye (or Riambeje), 137, 138,  
 139, 141, 143, 150, 162.  
 Leaug-Shan, 81.  
 Lebrun, Mr. George, 35.  
 Leebea, 152.  
 Leesemage, 146.  
 Lefroy, Colonel, 298.  
 Lefroy-Valley Mount, 298.  
 Lefun, 227, 232.  
 Lemon, 8.  
 Lentembo, 150.  
 Leo, 119, 121, 126.  
 Leon, 45, 47, 58, 64, 66, 136.  
 Leona, 151.  
 Leo's Sungai, 119.  
 Lesson, 172, 175.  
 Leti, 165.  
 Len-shan, 85, 88.  
 Lewin, 150.  
 Liamutenga, 140.  
 Liang-tze, 89.  
 Libeli, 150.  
 Libtáko, 122.  
 Liebenberg Vley Spruit, 237, 238, 254.  
 Lima, 5, 11.  
 Limpopo, 250.  
 Little Belly River, 291.  
 Little Fork Pass, 296.  
 ——— River, 300.  
 Little Red Deer River, 313.  
 Little Top, 264.  
 Liverpool, 1.  
 Liumutenga, 144.  
 Livingstone, Dr., 137, 138, 139, 140,  
 150, 159.  
 Lizzard Lake, 283.  
 Llangañate, 72, 73.  
 Loamba River, 140.  
 Loangué, 141, 142, 152.  
 Loando, 137, 146.  
 Loaputo, 138.  
 Lobale, 150, 162.  
 Loehenberg's, 245.  
 Lóggone, 122.  
 Logón, 122.  
 Lohengue, 144, 145.  
 Loja, 64.  
 Lokono, 131.  
 Lokoya, 133.  
 Lombard's Farm, 243.  
 Lomboek Island, 176.  
 Lombullo, 145.  
 Long River, 271, 272, 312.  
 ——— shale, 272, 275.  
 Longa, 138.  
 Longoma, 142.  
 Longwood, 265, 266.  
 ——— House, 263.  
 Lopez, Fernan, 261.  
 ———, Thomas, 261.  
 Loquek, 132.  
 Loquera, 142.  
 Loredó, 17.  
 Loreto, 34, 37.  
 Los Altares, 71.  
 Losoya, Mr., 44.  
 Losuma, 146.  
 Lotien Range, 89.  
 Lovale, 151.  
 Lower Fort, 271.  
 Lower Island Portage, 269.  
 Lower Saskatchewan River, 288.  
 Luaba, 157, 158.  
 Lualaba, 150, 152.  
 Luana, 150, 161.  
 Luapula, 150, 152, 154.  
 Luaxe River, 151.  
 Luatele, 151.  
 Lubaiea, 151.  
 Lúbim, 121.  
 Lubire, 150.  
 Lucalla, 151.  
 Lucan's Pharsalia, 134.  
 Lucenda, 152, 153, 154.  
 Luengue River, 140.  
 Luffia, 148.  
 Lugebungo, 150.  
 Lubaiea, 151.  
 Lui River, 140.  
 Lukoya Lake, 131.  
 Luma, 150.  
 Lumbuambua, 137.  
 Lumbue, 142.  
 Lumbungo, 143.  
 Lumege, 150.  
 Lunda, 151.  
 Lunde, 143.  
 Lunupa, 146.  
 Lupata, 158, 159, 161.  
 Lupire River, 138.  
 Lussue, 115.

- Lutipnea, 152, 154.  
 Luvar, or Luval Levale, 149, 150, 151.  
 Luvirey, 154.  
 Luy, 139, 142.  
 Lyell, Mount, 301.
- Macacoma, 150.  
 Macas, 71.  
 Macassar, 172.  
 Mackenzie River, 282, 312.  
 Mackintosh, Mr. William, 10, 11, 45.  
 MacLuer Inlet, 175.  
 M'Clure, Sir Robert, 75.  
 Maconda, 147.  
 Macorumaze, 155.  
 Macqueen, Mr. J., 128 *et seq.*  
 Madjame, 128.  
 Magaliesberg, 239, 242 *et seq.*, 252, 253.  
 Maghtér, 114.  
 Magurichic, 17.  
 Mahaniso, 150.  
 Mahata, 248.  
 Malo, 133.  
 Manabi, 64.  
 Managua, 58.  
 Mandi, 117.  
 Mandingo states, 118.  
 Mangando, 146.  
 Mangoaxe, 141.  
 Manica Gold Fields, 155 *et seq.*  
 Mansinam Island, 172, 175.  
 Manzanilla, 5.  
 Mapenda, 146.  
 Maquarachic, 26.  
 Marádi, 120.  
 Marañon, 71, 72.  
 Marave, 145.  
 Marcou, M. Jules, 274.  
 Marikwa River, 247, 248, 250.  
 Maritzbourg, 233.  
 Marysville, 2.  
 Más, 113.  
 Másina, 116, 119.  
 Mason Island, 77.  
 Masoya Lake, 58.  
 Massangano, 159.  
 Massappa, 155, 156.  
 Massomedes to Caemdo, 161 *et seq.*  
 Masoorá, 157.  
 Massurah Point, 167.  
 Ma-toong-shan, 85.  
 Matope, 161.  
 Matris, 255.  
 Ma-tse-shan, 86, 88.  
 Matabong, 179.  
 Mattendo River, 140.  
 Maubal, 161.  
 Maxito, 145.  
 May, D. J., 212 *et seq.*  
 Maya, 44.
- Mayo River, 18.  
 Mazatlan, 1 *et seq.*, 15, 31, 39, 43, 44, 45, 47.  
 Mazavios River, 155.  
 Mazora, 157.  
 Mechoacan, 53, 55.  
 Medicine River, 282, 287, 289.  
 Mediterranean, 112, 113.  
 Meilan Hill, 86.  
 Mekom, 182, 183, 184.  
 Mekong, 182, 183, 184.  
 Melinda, 132.  
 Mellado, 50.  
 Melle, 117, 118.  
 Mendazona, M., 35.  
 Merendon, 60.  
 Mescalita, 13.  
 Mesjid Ali, 204.  
 Mesquite Caído, 19.  
 Metho, 182.  
 Mexico, ancient Volcano in, 53 *et seq.*  
 ———, Gulf of, 314.  
 ———, Journey in, 1 *et seq.*  
 ———, N.W. Provinces of, 1.  
 Meyer Hoek, 234.  
 Miambar, 60, 62.  
 Miguel, 19.  
 Miller, Mr., 36.  
 Milua, 140.  
 Mina del Rosario, 26.  
 Minetobass Hills, 310.  
 Miniana, 118.  
 Minnesota, 267.  
 Miquimdame, 146.  
 Miringonde, 161.  
 Mira, 69.  
 Mizda, 259.  
 Mocha, 66.  
 Mocomaze, 161.  
 Mocorito, 13.  
 Mocorivo, 40.  
 Modákake, 215, 216.  
 Mofó Lake, 154.  
 Moldavia, 162, 163.  
 Mombas, 123, 130.  
 Monelet, M., 58.  
 Monomatapa, 154, 156, 159.  
 Montaya, 16.  
 Montecillos, 60.  
 Monteiro, 149.  
 Monterde, 31.  
 Montesclaros, 17.  
 Montreal, 309.  
 Mooang Kabin, 178.  
 Mooi, 241, 253.  
 ——— River, 233, 241, 242, 252.  
 ——— River's Great Eye, 243.  
 ——— River stone, 244.  
 Mookan Lake, 83.  
 Moombush, 157.  
 Moon, Mountains of the, 115, 135  
 Moose Mount, 273, 275, 310.

- Morambula, 157.  
 Morapo, 151.  
 Mord Spruit, 234.  
 Morelos, 36, 38.  
 Morita, 13.  
 Morocco, 123.  
 Moselakatse, 156, 253.  
 Mosi, 122.  
 Mosusuro, 154.  
 Moudir Bey, 256.  
 Mountain Fort, 302.  
 ——— House, 219, 281, 312, 313.  
 Movizas, 142.  
 Moxico, 151.  
 Mozambique, 145, 147, 156, 157, 159.  
 Muamba, 145.  
 Muata, 150.  
 Muata Yanvo, 151.  
 Muaze, 155.  
 Mucary, 151.  
 Mucorumaze, 155.  
 Mudas, 133.  
 Muchenga, 151.  
 Muchinga, 142, 143, 146, 149, 150, 152.  
 Mucimbue, 147.  
 Mueza, 138.  
 Muiri Achinto, 153.  
 Muiza, 152.  
 Mujumba Acalunga, 151.  
 Mulatos, 26.  
 Mullinga, 144.  
 Munda de Locondo, 161.  
 Muuden, Captain, 262.  
 Mungora, 155.  
 Munbona River, 137.  
 Muningo, 151.  
 Murchison, Mount, 301.  
 Murchison, Sir Roderick, 267.  
 Muropoa, 151.  
 Murucurixy, 150, 154.  
 Marzuk, 113.  
 Musambay, 157.  
 Musay, 126.  
 Musgu, 124.  
 Musocma, 150.  
 Mutembe, 138.  
 Muttenga, 143.  
 Muvuze River, 155.  
 Muzimbua, 146.  
 Muzire, 138.  
 Myfor Island, 174.  
 Mysool Island, 177.  
 Mysory Island, 174.  
  
 Nabojoa, 12, 18.  
 Nagi, 229.  
 Nakon Illuang, 185, 191, 193, 194.  
 ——— Wat, 185, 186, 188, 190, 191, 194.  
 Nakupá, 229.  
 Nambuata, 139.  
 Namucan Lake, 270.  
  
 Nam-wang, 182.  
 Nang-shan-ke, 83.  
 Nankin, 76, 77, 79, 80, 94, 95, 96, 100.  
 Nanno, 138, 162.  
 Napo, 72, 73.  
 Napoleon Bonaparte, 263.  
 Naranjab, 71.  
 Narogame, 17.  
 Nasamones, 126.  
 Natal, 234, 235, 236, 241, 246, 255.  
 Nanta, 74.  
 Negroland, 113, 155, 120, 123, 124, 126, 127.  
 ——— Central, 115, 117.  
 Nelson Kop, 235.  
 Nenda River, 139.  
 Nestor, 35.  
 Neuda, 138.  
 Nevada City, 2.  
 New Almaden, 2.  
 New Guinea, Voyage to, 172 *et seq.*  
 New Granada, 64, 69.  
 New Orleans, 1.  
 New York, 1, 59.  
 Ngami Lake, 247.  
 Ngan-hwui, 84, 85.  
 Ngbatado, 222, 223.  
 Ngwe, 156.  
 Nhanja, 144, 154.  
 Nhecimo, 141.  
 Nhionja, 144.  
 Nhoca, 142.  
 Nhombaxe, 144.  
 Niagara Falls, 269.  
 Nicaragua, 11, 58, 59.  
 Nick Hills, 312.  
 Niger, 112 *et seq.*, 128, 148, 212.  
 ——— Upper, 119, 12.  
 Nile, 112, 113, 121, 148.  
 Nine Dragon River, 182.  
 Njoke, River, 140.  
 Nohkukén, 59.  
 Norway House, 282.  
 Novachista, 5, 17, 44.  
 Nubia, 121, 123.  
 Núpé, 223, 225, 226, 228, 230, 231, 232.  
 ——— Ajéle, 226.  
 Nyassa, 135, 145.  
 Nyc, Capt., 2.  
 Nyffi, 125.  
  
 Oaxaca, 51.  
 Ohágba, 212.  
 Obba, 213, 214.  
 Ochakoff, 169.  
 Ocoroni River, 14.  
 Ocorona, 14, 15.  
 Odessa, 166.  
 Offa, 213.  
 Ogbáwmoshaw, 212, 213.  
 Ogún, 214.  
 Oheoinga, 141.

- Ohegy, 151.  
 Ohtan, 220.  
 Ojita, 16.  
 Oke-bóde, 219.  
 Olancho, 60.  
 Old Bow Fort, 288, 289, 296.  
 Old Bow River, 291.  
 Old Columbia, 64.  
 Old Fort, 297, 298.  
 Old Portage, 262.  
 Olifant's Neck, 251.  
 Olifant River, 250.  
 Oliphant, Mr. Laurence, 75 *et seq.*  
 Olinka, 169.  
 Oliver, Black, 262.  
 Oltenitza, 163.  
 Omoa, 62, 63.  
 Oodong, 180, 185, 193, 194.  
 Opaca, 144, 145.  
 Opolaca, 60.  
 Orange River Sovereignty, 233 *et seq.*  
 Oriente, 64.  
 Orinoco River, 196.  
 Orizava, 49.  
 Orsova, 162.  
 Osborn, Capt. Sherard, 75, 76, 94.  
 Oshógo, 219, 220, 221.  
 Oshún, 214, 219, 231.  
 Otero, 37.  
 Otoro, 60.  
 Ottertail Lake, 267.  
 Owá, 218.  
 Owen, Capt., 157, 158.  
 Owú, 221.  
 Oyéle, 219.  
 Oyi, 227.  
  
 Paca-yacu, 71, 78.  
 Pachim, 178.  
 Pachuca, 48, 51.  
 Pacific Ocean, 3, 58, 64, 71, 177, 293,  
     294, 314.  
 Padongo, 133.  
 Pagan Nations, 123.  
 Pailon, 69, 70.  
 Pajichic, 17.  
 Pa li-kiang, 86.  
 Pallegoix, 177, 179, 184.  
 Palliser, Capt. John, 267 *et seq.*  
 Palma River, 214.  
 Palmer, Major, 260 *et seq.*  
 Palmerejo, 30.  
 Palmyra, 207, 208.  
 Panama, 1, 69, 293.  
 Pangany River, 131.  
 Pan-tze-ke, 82.  
 Pará, 74.  
 Parker, Sir William, 95.  
 Park, Mungo, 127.  
 Pastasa, 71, 74.  
 Peace River, 312.  
 Pearce, Mr., 131.  
  
 Pedro Baptista, 151, 152, 154.  
 Pekin, 79.  
 Pembina, 294.  
     — Mount, 274, 275.  
     — River, 271.  
 Penet Pra, 181.  
 Pereira, 154.  
 Perez Galvez, 48, 52.  
 Persia, 199.  
 Pertenenencia, 28.  
 Peru, 64, 71, 73, 74.  
 Peschana, 169.  
 Peten, 58.  
 Petrio Canal, 177.  
 Peyrot, Mr., 55.  
 Phan-yen, 182.  
 Phra Pathim Suriwong, 193  
 Piastla River, 8.  
 Pichincha, 64, 66, 67.  
 Pico de Orizaba, 58.  
 Pieterse, 241.  
 Pigeon Peaks, 297.  
 Pih-hoo-shan, 90.  
 Pih-tze-shan, 89.  
 Pike Lake, 276.  
 Pillan's Berg, 250.  
 Pillar Hills, 81.  
 Pina Loo, 180.  
 Pingeh, 184.  
 Pirará, 196.  
 Pitt Fort, 275 *et seq.*, 284, 312, 313.  
     — Strait, 177.  
 Placerville, 2.  
 Plattberg, 235, 236, 238, 254.  
 Plaza, 3, 4.  
 Plover Point, 77, 94.  
 Polar Seas, 9.  
 Pompeii, 78.  
 Pongo de Manzeriche, 72.  
 Pong-som, 183.  
 Pon-tea-mas, 183.  
 Poonterang, 180.  
 Popocatepetl, 48.  
 Potai-mat, 183.  
 Potato Bay, 265.  
 Poteron, 13.  
 Potgieter, Hendrick, 253.  
 Potrero, 8.  
 Potschefstroom, 241, 253.  
 Poyang Lake, 85 *et seq.*, 90, 98.  
 Prazo Sorre, 161.  
 Presidio, 6.  
 Pretorius, 242.  
 Pretorius's Kloof, 237.  
 Pritchett, G. J., 64 *et seq.*  
 Prosperous Bay, 262, 265.  
 Pruth, 162.  
 Ptolemy, 135.  
 Puebla, 49.  
 Pueblo of Cosala, 7.  
     — Guamanche, 8.  
     — Viego, 10.

- Pullo, 119.  
 Pulo Obi, 183.  
 Puno, 74.  
 Purchas's Pilgrims, 261.  
 Pyramid Mountain, 299.  
  
 Qu'Appelle Lakes, 275.  
 Quando, 162.  
 Queena, 161.  
 Querna, 145.  
 Quiboca, or Quuios, 150.  
 Quicauga, 145.  
 Quicema, 142, 143.  
 Quicenza, 143, 144.  
 Quiduk, 182.  
 Quiengo, 137.  
 Quie River, 162.  
 Quilboco, 151.  
 Quillimane, 157, 158.  
 Quillingues, 161, 162.  
 Quinhama, 150, 151.  
 Quipembe, 145.  
 Quissamange, 150.  
 Quissamba, 150.  
 Quissanga, 156.  
 Quisulongo, 137.  
 Quiteve, 156.  
 Quitivis, 12, 18.  
 Quito, 64, 65, 67, 68, 69, 70, 71.  
  
 Rabba, 228, 230.  
 Rabbai Impey, 128.  
 Rachgea, 183.  
 Rainy Lake, 268, 270.  
 ——— River, 271.  
 Ramirez, Senhor Guadalupe, 35.  
 Ramusius, Battisto, 261.  
 Rancho del Toro, 61.  
 Rás Adar, 115.  
 Raseganagah Lake, 269.  
 Rat Portage, 270.  
 Rayas, 57.  
 ———, Marquis de, 52.  
 Reader, W., 212, 224.  
 Real del Monte, 48, 50, 52.  
 ——— Reazelm, 164.  
 Rebmann, Mr., 128, 130, 131.  
 Redberry Lake, 278.  
 Red Deer River, 287, 289, 308, 312, 313.  
 ———, Forks of the, 282.  
 Red River, 131, 267, 271, 274, 280, 281,  
 282, 284, 295.  
 Redruth, 1.  
 Regla, 48.  
 Rendsburg, H., 245.  
 ——— Farm, 239.  
 Rennell Mountains, 228.  
 Renoster River, 236, 237, 239, 240, 242,  
 253, 254, 255.  
 Retief, 234.  
 Revue, 155.  
  
 Riambeje (or Leambaye), 138, 141, 143,  
 150.  
 Riamandura, 145, 147.  
 Richardson, Mount, 301.  
 Richardson, Sir John, 268.  
 Rio Agateca, 62.  
 Riobamba, 73, 74.  
 Rio Blanco, 62.  
 Rio Cinaloa, 17.  
 Rio Conchos, 32.  
 Rio Culiacan, 31.  
 Rio de Batopilas, 17, 37.  
 Rio de Chinapas, 37.  
 Rio de Choix, 17, 19, 37.  
 Rio de las Casas Grandes, 28.  
 Rio del Fuerte, 28.  
 Rio de Otero, 17, 19.  
 Rio de Urique, 17.  
 Rio El Fuerte, 16, 17, 18, 37, 38, 44.  
 Rio El Tigre, 19.  
 Rio Gila, 28.  
 Rio Grande, 37, 42, 48.  
 Rio Imaya, 13.  
 Rio Jaitique, 62.  
 Rio Mayo, 18, 27, 44.  
 Rio Morelos, 36.  
 Rio Negro, 71.  
 Rio Sacapa, 60, 62.  
 Rio St. Miguel, 37.  
 Rio Salala, 60.  
 Rio Santa Barbara, 62.  
 Rio Santa Maria, 16.  
 Rio Urique, 36, 37.  
 Rio Verde, 17, 36.  
 Rio Yojoa, 62.  
 Roango (or Arroango), 142, 143, 145,  
 153, 155, 159.  
 Robengo, 133.  
 Roche Percée, 273, 274, 275, 313.  
 Rocky Mountains, 279 *et seq.*, 310, 313.  
 ——— House, 279, 302.  
  
 Rohenga, 133.  
 Rókoko Mount, 225.  
 Roos, 238.  
 Rosario, 6.  
 Roum, 131.  
 Rovuma, 146.  
 Ruareze, 152.  
 Rubi, 121.  
 Rundle Mountains, 297.  
 Rupert Bay, 265.  
 Rustenberg, 246, 247.  
 Rutz's Farm, 239.  
  
 Sabanetta, 65.  
 Saba Quipala, 145.  
 Sabaut (or Seboth River), 131, 133, 136.  
 Sabia, 156.  
 Sacapa, 61.  
 Sacramento River, 2.  
 Sa da Bandeira, Viscount, 151, 155.  
 Sadek, 182.



- Saeumbuge, 151.  
 Sahara Desert, 255, 256, 258, 259.  
 Saigon, 184.  
 St. Ann, Lake, 280, 295, 308, 309.  
 St. Anthony, 261.  
 St. Blas, 5, 11, 45, 47.  
 St. George Branch, 169.  
     —— Chatal, 165.  
     —— River, Mouth of, 163, 164,  
         166, 168, 170, 171.  
 St. Helena, Notes on Map of, 260 *et seq.*  
 St. Joaquim, 34, 37.  
 St. Joseph, 274.  
 St. Lucas, Cape, 1.  
 St. Miguel, 17, 35, 36, 37, 48.  
 St. Nicholas, 38, 52.  
 S. Nicolas, Monte, 50.  
 St. Paul, 294.  
 St. Thomas, 49.  
 Salala, 62.  
 Salamanca, 48.  
 Salido, Don Martin, 30.  
 Salwatty Island, 172, 177.  
 Sama, 124.  
 San Andres, 54, 55, 56, 58.  
 San Antonio, 35.  
 San Augustin, 50, 51.  
 San Blas, 5, 11, 45, 47.  
 San Clemente, 52.  
 Sanderson, Mr. J., 233 *et seq.*  
 Sandhills, Regions of, 113.  
 San Diego, 32.  
 Sand River, 239, 241, 242.  
 Sand Spruit, 255.  
 Sandy Bay, 264, 265.  
     —— Barn, 265.  
 Sane Valley, 263.  
 San Francisco, 1, 19, 68.  
     —— del Oro, 32.  
 Sangay, 68, 71.  
 Sango, 151.  
 Sangre de Cristo, 30.  
 Sangué, 155.  
 San Joaquim, Fort, 196.  
 San José, 2, 63.  
 San Juan, 60.  
     —— de Dios, 36.  
     —— de los Lagos, 45, 46.  
 San Lorenzo, 9.  
 San Luis Potosi, 50.  
 San Miguel, 17, 35, 36.  
 San Nicolas, 38, 52.  
 San Pedro, 35, 70.  
     —— de Batopilas, 34.  
     —— di Guadalupe, 35.  
 San Salvador, 58.  
 Sansanne Mangho, 118.  
 San Shan, 80.  
 San Shan Point, 100.  
 Santa, 155.  
 Santa Barbara, 60, 61, 62.  
 Santa Clara, 2.  
 Santa Cruz, 12.  
 Santa Cruz de Mayo, 12, 18.  
 Santa Domingo, 33.  
 Santa Eulalia, 33, 43.  
 Santa Fé, 30.  
 Santa Gertrudis, 33.  
 Santa Juliana, 27.  
 Santa Ludubign, 27.  
 Santa Rita, 30.  
 Saquisili, 66.  
 Säre, 227.  
 Saskatchewan, 276, 278.  
     —— River, 267, 272 *et seq.*,  
         311, 312, 314.  
     ——, North Branch of the, 292.  
     ——, South Branch of the, 292, 296.  
 Saussure, Henry De, 53 *et seq.*  
 Sawhack Range, 314.  
 Say, 116, 119, 120, 126.  
 Schahl, Mr., 1.  
 Scheepers, 238.  
 Schomburgk, Sir R., 177.  
 Schuit, Philip, 252, 253.  
 Schnurte, 245, 250.  
 Seale's Geognosy, 265.  
 Seamara River, 142.  
 Seaou-koo-shan, 85, 86.  
 Seaton, Major, 271.  
 Seboth (or Sabaut) R., 131, 133, 136.  
 Secula Bamba, 151.  
 See-Leang-Shan, 81.  
 Seenawan, 255, 258.  
 Se-fan, 182.  
 Segar, John, 262.  
 Selaque, 60.  
 Selim, 132.  
 Selon River, 245, 250.  
 Sena, 155, 156, 157, 158, 161.  
 Sennár, 115.  
 Senegal, 115, 118, 119, 126, 127, 148.  
 Sensenti, 60.  
 Sententrion, 31.  
 Servian Hills, 162.  
 Seseccate, 62.  
 Seven Falls, 270.  
 Seven Portages, 270, 271.  
 Sevin, Mr. C., 1 *et seq.*  
 Sezacapa, 62.  
 Shanghae, 90, 93, 94, 99, 100.  
     —— River, 76, 77.  
 Shangra, 156.  
 Shat-el-Arab, 199.  
 Shaw, 228, 232.  
     ——, Antoine, 285.  
 Sheffield, 24.  
 Shen-Shau Kya, 82.  
 Shire, 144.  
 Shoa, 133.  
 Shua (Shura or Shuru) Mt., 129, 130.  
 Shuñá, 73.  
 Shura (Shua or Shuru) Mt., 129, 130.  
 Shuru (Shua or Shura) Mt., 129, 130.

- Siam, 176 *et seq.*  
 Sidi Okba-el-Beddri, 256.  
 Sierra, 6 *et seq.*, 45, 47.  
 Sierra Alta, 24.  
 Sierra Caliente, 38.  
 Sierra Cari, 159.  
 Sierra Fria, 38.  
 Sierra Madre, 2, 8, 9, 15, 21, 27, 28, 30, 31, 36, 37, 40, 42, 43.  
 Sierra Leone, 118, 219.  
 Sierra Muchinga, 152, 153, 154.  
 Sierra Nevada, 2.  
 Sierra Ucenda, 143.  
 Sigilmása (or Sijilmésa), 125.  
 Siguatepeque, 63.  
 Sijilmésa (or Sigilmása), 125.  
 Silla, 127.  
 Silva Alexandre da Texeira, 150, 183.  
 Silva Porto, Journeys of, 136 *et seq.*  
 Silver Island, 78, 94, 95, 99.  
 Simien, 134.  
 Simpson, Mr., 278.  
 ———, Sir George, 309.  
 Šimsap, 179, 181.  
 Singapore, 183.  
 Sitao, 47.  
 Siu River, 86.  
 Sluft, 123.  
 Smith Lake, 180.  
 Smidt, Christian, 239, 244, 254.  
 ———, Hans, 246.  
 Snake Hill, 312.  
 ——— Portage, 312, 313.  
 Snow Mountains, 129.  
 Soba Cahinga, 141.  
 ——— Caleda, 138.  
 ——— Gaue, 142.  
 ——— Utumbuca, 144.  
 Sockna, 259.  
 Sofala, 156.  
 Sofára, 122.  
 Sokoto, 124.  
 Somal Coast, 112.  
 Sombrerete, 51, 52.  
 Songhay, 118, 120, 125, 126, 127, 128.  
 Sonora, 2, 6, 14, 15, 17, 26, 27, 35, 38, 40, 44.  
 Souro, 133.  
 Sova, 161.  
 Spartel, Cape, 115.  
 Spratt, Capt., 167.  
 Spruce, Mr. K., 73, 74.  
 Squier, E. G., 58 *et seq.*  
 Stamboul Branch, 169.  
 Stanton, Ed., Lt.-Col., R.E., 59, 61.  
 Staroi Kilia, 163.  
 Sterk Spruit, 250.  
 Stictina, 209.  
 Stirling, 245.  
 Stokes, Major, 162 *et seq.*  
 Stone Top Point, 264.  
 Stony Hill, 271, 310.  
 Stranger, Dr., 233.  
 Surgeon Lake, 269, 270.  
 Suaba, 144.  
 Sugar Loaf Point, 265.  
 Salina, 164, 165, 166, 167, 168, 169.  
 Sullivan, Mr., 268, 276 *et seq.*, 308, 309, 314.  
 Sullivan Peak, 301.  
 Sumatra, 182.  
 Sungue, 156.  
 Sang-lo Hill, 86.  
 Superior, Lake, 268, 269, 270, 271, 275, 310.  
 Suppine, 210.  
 Susú, 118.  
 Swanley Valley, 262.  
 Swanston, Mr., 281, 282.  
 Switzerland, 42.  
 Syria, 115, 206, 210.  
 Tacazze, 134.  
 Tacubaya, 48.  
 Tacnehamano, Pueblo of, 9.  
 Tacula, 48.  
 Tademekkas, 125, 126.  
 Tadmor, 207, 208.  
 Ta-hwa-shan, 83.  
 Tai-Ping, 80, 81, 96.  
 Taita, 128, 130, 131.  
 Tai-tze-ke, 84.  
 Ta-Kiang, 79, 81, 84, 85, 86, 87, 90, 92.  
 Ta-koo-shan, 86.  
 Talá Sap, 184, 195.  
 Tambara, 159.  
 Tampico, 47.  
 Tanganyenka, 135.  
 Tangibs, 259.  
 Tangolane Point, 157.  
 Tarahnmare, 37.  
 Tarapoto, 71, 73.  
 Tasajera, 16, 19.  
 Tasawai, 179.  
 ——— River, 178.  
 Tasco, 51.  
 Ta-toong, 83.  
 Taulebé, 58 *et seq.*  
 Tavalá, Great, 9.  
 Tawát, 113, 114, 117, 118, 125.  
 Taximaroa, 54.  
 Taylor, Dr. James, 73.  
 Tebu, 113, 114.  
 Tegucigaessa, 60.  
 Teguilla, 45.  
 Tek-maou, 183.  
 Teksea, 182.  
 Temásanin, 113.  
 Temescaltepie, 51.  
 Tepahuja, 9.  
 Tepic, 45, 46.  
 Tepooi, 159.  
 Ternate, 172, 174, 175.  
 Terra Caliente, 30.

- Terra Fria, or Sierra Alta, 20, 21.  
 — Templada, 20.  
 Tete, 150, 151, 154, 158, 159, 161.  
 Texas, 24.  
 Tfilfelt, 255.  
 Thamiel, 205.  
 Thickwood Hills, 278, 300.  
 Thompson, 45, 198.  
 Thwart Mountains, 250.  
 Tibesti Mountains, 113.  
 Tigris, 199.  
 Timbúktu, 116 *et seq.*, 259.  
 Tiná Camoa, 18.  
 Tiopuyo, 67.  
 Tippoe, 156.  
 Tishit, 16, 113.  
 Toong-lew, 84, 85.  
 Toong-ting Lake, 89, 99.  
 Tópo, 72, 73.  
 Topographical Dept., projection used in  
   the, 160 *et seq.*  
 Tóro, 119.  
 Touchwood Hill Post, 277.  
 Toulcha, 164.  
   — Branch, 165, 169.  
   — Rock, 164.  
 Townhill, 233.  
 Townsend, Rev. Mr., 233.  
 Transvaal Boers, 233 *et seq.*  
 Trieste, 130.  
 Trinidad, 51.  
 Tripoli, 255, 259.  
 Tristan d'Acunha, 263, 264.  
 Tsád, or Chad, 113, 117.  
 Tsai-shih-ke, 80.  
 Tsa-ke, 86.  
 Tsung-ming, 77.  
 Tsung-yang, 84.  
 Tsung-yang River, 86.  
 Tuat, 259.  
 Tubares, 37.  
 Tubiri, 130, 132.  
 Tugela, 234.  
 Tugulla, 255.  
 Tuia, 12.  
 Tumbiri, 132.  
 Tunguragna, 68, 71.  
 Tunis, 125, 256, 259.  
 Turf Fontein, 243.  
 Turkey, 131.  
 Turk Cap Bay, 265.  
 Turna Severin, 163.  
 Turtle Mount, 273, 275.  
 Tyba, 207, 208, 209.  
 Ualero, 144, 145.  
 Ueenda, Mount, 152.  
 Uimba, 131.  
 Ujiji, Lake, 135.  
 Ukambane, 130.  
 Umgeni, 233.  
 Urea, Mr., 30.  
 United Mexican, the, 50, 51, 52.  
 United States, 24, 43.  
 Urique, 19, 20, 22, 23, 24, 25, 26, 29,  
   34.  
 Uri River, 62.  
 Uru, 129, 130.  
 Usnma Na-Masai, 129.  
 Utanata River, 176.  
 Utumbuca, 143.  
 Uuruapa, 30.  
 Vaal, 236, 242, 248.  
   — River, 239, 240.  
 Vaca, 37.  
 Valenciana, 50.  
 Vancouver, 289, 291.  
 Vander Westhuys's, 246.  
 Van Vuuren's, 241.  
 Vaux, Mount, 300.  
 Vechtkop, 254.  
 Venezuela, 64.  
 Venice, 259.  
 Vera Cruz, 47, 49.  
 Vera Paz, 58.  
 Verde, 73.  
 Vermilion Pass, 296, 297, 311, 314.  
   — River, 298, 299, 300, 314.  
 Verneuil, Mr., 18, 21, 22, 44.  
 Veta Grande, 52.  
 Veta Madre, 51.  
 Viljoen, 237.  
 Villa de San Felipe y Santiago de Cina-  
   loa, 14.  
 Villa de San Sebastian, 6.  
 Villalpando, 50.  
 Villavicencio, Dr., 70, 73.  
 Vinegra, Mr., 23.  
 Vingh-tan, 182.  
 Vin-tam-phu, 183.  
 Vliege, or Fly Mountains, 250.  
 Vliume River, 162.  
 Vung-tom, 183.  
 Wádai, 123.  
 Wadán, 118, 126.  
 Wádi Gharbi, 114.  
 Wádi Kawár, 121.  
 Wádi Scháti, 114.  
 Wagion, 172, 174, 177.  
 Waláta, 118, 126.  
 Wallace, Mr. A. R., 172 *et seq.*  
 Wallachia, 162.  
 Wandammen, 175.  
 Wangara, 117, 122.  
 Waputteehk Mountains, 300.  
   — River, 302.  
 Warán, 114.  
 Ward, Capt., 76, 94, 99.  
 Wargeld, 113.  
 Wasulo, 118.  
 Water of Life, 205.  
 Werne, F., 130, 131.

- Western Cordillera, 47.  
 Whang-ho, 183.  
 White Fish River, 269, 270.  
 White Lake Hills, 310.  
 White Mountains, 238.  
 Wiesbaden, 47.  
 Wilge River, 235, 236.  
 Wilkovi, 164, 166.  
 William, Fort, 269.  
 Winapa, 9.  
 Winburg, 238, 255.  
 Windy Mount, 297.  
 Winnipeg Lake, 268, 270, 271, 274, 275.  
 Witch River, 251.  
 Wittebergen, 236, 237.  
 Witwater Rand, 245, 251, 252.  
 Woghodoghó, 122.  
 Woi River, 130.  
 Wonder Fontein, 252.  
 Woo-chang, 90, 91, 98.  
 Woo-hoo, 81, 82, 96, 99.  
 Woo-sueh, 86.  
 Woosung, 92, 94, 99.  
 Wumearque, 152.  
  
 Xacahunge, 151.  
 Xebire, 198, 199, 200.  
 Xire, or Chire, 154.  
 Xitora, 155.  
  
 Yágba, 225, 226, 232.  
 Yaqui River, 44.  
 Yah Quitem, 150.  
 Yang-chow, 79.  
 Yang-tze, 94.  
  
 Yang-tze-kiang, 180, 183.  
 ———, Ascent of the, 93 *et seq.*  
 Yang-tze, or Ta-Kiang, Voyage up the,  
     75 *et seq.*  
 Yanvo, 153.  
 Yaqui Indians, 45.  
 Yata, 130.  
 Yemale, 157.  
 Ylama, 62.  
 Yjoa, Lake of, 58 *et seq.*  
 Yojon, 62.  
 Yona, 194.  
 Yóruba, 122.  
 Yóruba and Núpe Countries, 212 *et seq.*  
 Young, Mr., 2.  
 Yuquivo, 29.  
 Yu-uam, 182, 183.  
  
 Zacatecas, 51, 52.  
 Zágba, 127.  
 Zaire, or Congo, 148.  
 Zambeze, 144 *et seq.*, 159.  
 ———, Upper, 149.  
 Zanfara, 120, 125, 126.  
 Zanzibar, 136, 143, 147.  
 Zea, Father, 196.  
 Zelaya, 48.  
 Zimbaoe, 156.  
 Zoutpanberg, 247.  
 Zulu-land, 253.  
 Zumbo, 153, 154, 156.  
 Zwarte Kopjes, 246.  
 Zwartklip, 240.  
 Zwart Kop, 233.

END OF VOL. XXX.











